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The American Journal of Obstetrics and Gynecology

VOL. VIII ST. LOUIS, AUGUST, 1924 NO. 2

Original Communications

ETIOLOGY OF CERTAIN CONGENITAL STRUCTURAL DEFECTS*

BY HALSEY J. BAGG, PH.D., NEW YORK CITY

Memorial Hospital and Cornell University Medical College

GENERAL CONSIDERATIONS

IT IS known that specific structural defects may be experimentally produced in developing embryos by various agents. The means employed, the disturbing factor or factors, are not so important as regards the subsequent morphologic changes in the embryo as is the exact developmental period at which the disturbance is produced. An experimental disturbance during the very early embryonic period is likely to result in various eye defects, cyclopia, etc., while an identical disturbance acting somewhat later will result in defective brain or branchial systems, and still later in malformation of the viscera. In other words, the same treatment may produce one or more characteristic defects depending on the so-called critical period of development when the treatment is given.

If fertilized eggs of a typical vertebrate, such as a fish, are brought into the laboratory, placed in dishes of water and kept in a crowded condition, the resulting lack of proper oxygenation and overproduction of carbon dioxide will result in the formation of various monsters. The same abnormalities may be brought about by lowering the temperature of the eggs, by treatment with various chemicals, salts of magnesium, alcohol, etc. It has been shown that double monsters and twins may be produced either by a decrease in the temperature of the developing eggs or by an insufficient supply of

*Read by invitation at the meeting of the New York Obstetrical Society, March 11, 1924.

oxygen. The developmental disturbances produced by any given set of factors acting at a definite embryonic period are to a considerable extent specific and predictable. We then see that various agents, either mainly chemical or physical in action, may produce under proper conditions one and the same type of developmental abnormality.

The experiments of Daresta[1] conducted over thirty years ago, initiated the study of these interesting conditions. More recently Stockard has surveyed the entire field and has analyzed the various factors involved. In his recent paper on "Developmental Rate and Structural

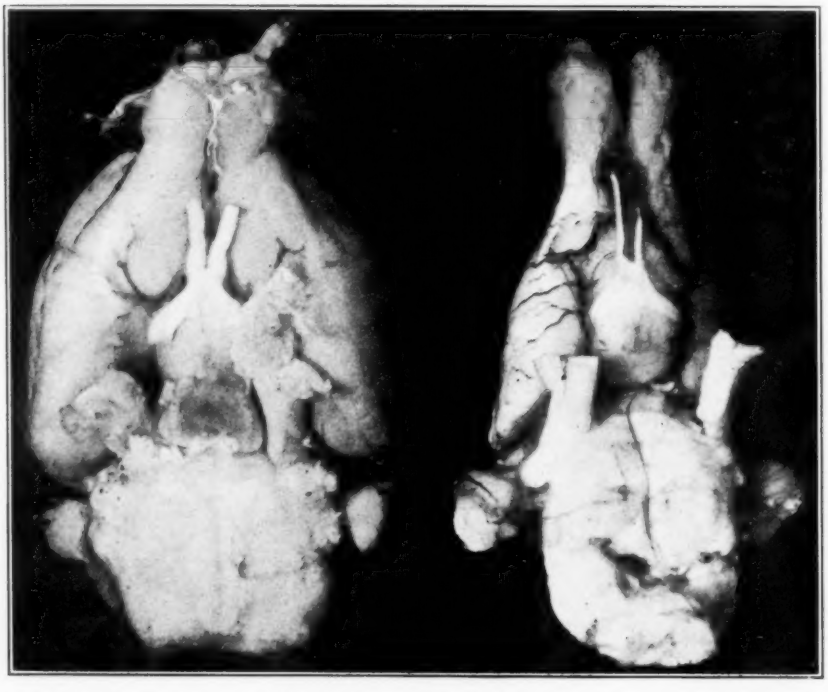

Fig. 1.—Ventral view of the brains of two adult rats. The one to the left is a control, showing well developed hemispheres and optic tracts. The brain at the right is from an animal irradiated *in utero* three days before birth and killed about a year later. Dose 1350 mg. hrs. of heavily filtered gamma-ray irradiation from radium emanation.

Expression,"[2] he has correlated many reactions. The experimentally induced embryonic abnormality apparently is due to an arrest in development at some critical growth period. The various disturbing agents have all tended to either temporarily slow or almost completely reduce the developmental rate. If the rate of development of an embryo is reduced for a limited period, then that part of the body which at that time normally would be developing the fastest is actually reduced and thereafter is never able to regain its normal rate in proper relation to other parts of the organism.

DEVELOPMENTAL ARRESTS IN MAMMALS

What is true for the ontogeny of fish and other lower vertebrates apparently holds for developmental arrests in the lower mammals. I have found in my studies on the effect of radium[3] and x-ray[4] irradiation on developing rats and mice treated *in utero* that blindness and various arrests in the development of the brain and the gonads, etc., were constant features. Many of the abnormalities were not apparent until a considerable time after birth.

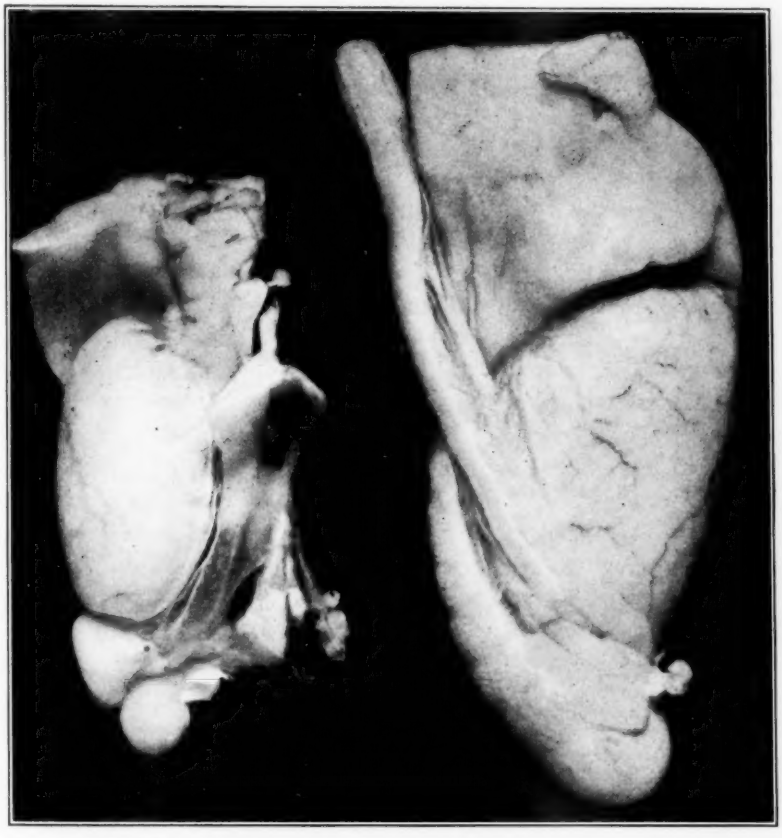

Fig. 2.—The testis at the left shows a pronounced arrested development due to irradiation *in utero*. The testis at the right is a control from an animal of about the same age and weight. Dose the same as given in Fig. 1.

An example of arrested brain development is shown in Fig. 1. The illustration at the left is a ventral view of the brain of an adult rat with well developed hemispheres and optic tracts. The brain at the right was photographed at the same magnification and was taken from an animal irradiated *in utero* towards the end of pregnancy. The animals were about the same age when killed. The irradiated brain shows a marked reduction in the size of the hemispheres asso-

ciated with pronounced atrophy of the optic tracts. The arrested development of the testes of the irradiated animal is shown at the left of the illustration in Fig. 2 with a normal testis at the right for comparison.

Just a year ago, in conjunction with Dr. Harold Bailey, I had the opportunity to present before the Section of Obstetrics and Gynecology, at the Academy of Medicine, certain experimental and clinical data concerning the effects of irradiation on fetal development.[5] It will not therefore be necessary to repeat here the evidence for and against the possibility that present day clinical irradiation may affect human development. To make our position clear, however, I would add the following from our conclusions which were drawn at that time: "It is questionable whether radium or x-ray irradiation should be used to destroy the ripe follicles, leaving the immature ones injured but capable of development. This statement is made entirely on the strength of the experimental work on the lower animals and we do not feel justified in considering any of the available clinical records as adding conclusive evidence in this regard. In the treatment of menorrhagia in the child-bearing period we believe that complete sterility is preferable to the possibility of a damaged germ plasm. Irradiation of the ovum during early pregnancy should never be permitted. Radiation in late pregnancy, while it may not produce gross abnormalities at birth, may hinder the growth and development of the child in later life."

Again in regard to the data from which the above conclusions were drawn, it is proper to state that there are several cases reported in the literature where apparently normal children have been born following exposure to irradiation, and a full presentation of the available records is given in the above-mentioned paper

At the time the above report was made we very briefly mentioned some experiments that I had been conducting concerning the occurrence of hereditary abnormalities in mice following x-ray irradiation.* I wish now to mention very briefly the main results of that study which have been but recently obtained. This material is presented, not only to demonstrate the occurrence of hereditary abnormalities associated with irradiation, but to suggest the possibility of certain factors being related to their production.

HEREDITARY DEFECTS ASSOCIATED WITH X-RAY IRRADIATION

A group of mice from a well-known homozygous strain was divided by chance into two parts. In one group both male and nonpregnant female animals were irradiated for twelve seconds on each of five consecutive days with a light dose of unfiltered x-rays.** The animals

*Dr. C. C. Little was associated with me during the years 1920 to 1922, during which time the genetic tests were made.

**Target skin distance 12 inches; 10 milliamperes of current, 2½ inch spark gap.

were then mated. Those of the other groups were also mated and kept as a control. In the third generation of one of the irradiated lines an animal was found with a defective eye. Later many such animals were obtained. The defect has been found to be definitely inherited and in certain families occurs in 100 per cent of the offspring of defective parents. The abnormality behaves as a mendelian recessive, i.e., if in a mating one parent, either a male or female, is genetically abnormal for a certain eye defect and is mated with a perfectly normal animal, then approximately one-fourth of their grandchildren will reproduce the characteristic of their abnormal grandparent. The first generation individuals of such a cross have always been normal and the second generation has been obtained from them by *inter se* matings. Although the control animals have been subjected to exactly the same inbreeding as were those from irradiated parents no such hereditary abnormalities have been found in the examination of over 2000 individuals. Over 4500 abnormal animals have been examined. Other structural disturbances have been closely associated with the eye defect. Abnormality of the limbs, club feet, syndactylism and polydactylism have been most prominent. Recently I have noted the occurrence of various kidney abnormalities in this strain, from a partial to complete absence of one kidney to congenital absence of both.[6, 7]

I have been interested in the etiology of developmental defects and it has thus been a unique advantage to have had for study a large number of animals with hereditary abnormalities. The examination *in utero* of many young from abnormal parents has led to the conclusion that such defects are mainly of the nature of arrested development. Stockard[2] has claimed "that all types of monsters not of hereditary origin are to be interpreted simply as developmental arrests." I would add that certain structural abnormalities of my experimental strains that are definitely inherited, apparently also are of the same nature, and the following data very briefly describe the evidence on which this statement is made.

EXPERIMENTAL RESULTS CONCERNING THE ETIOLOGY OF HEREDITARY DEFECTS

Nature of the Abnormalities.

1. *Eye Defects.*—The eyelids of young mice are tightly closed at birth and remain so for several days. Many of the abnormal animals have shown at birth an arrested development of the the eyelids over one or both eyes. In such cases the lens usually protrudes from the head and the anterior chamber of the eye is missing. Such animals always become blind in later life. When young from abnormal parents are examined *in utero* the pronounced frequency of localized blood vascular extravasations, especially in the head region, is a most striking characteristic, and is a feature not found in the control animals. The fetus at the right of Fig. 3, (it was removed from the uterus when about 8 mm. in length) shows a well marked

hemorrhage covering the left eye as well as another in the region of the left kidney.

2. *Foot Defects.*—Club feet are frequently found associated with the eye defects. Animals with abnormal limbs may or may not show at birth the presence of hemorrhagic lesions at the extremities, but several animals have been found with such conditions, which suggests that there is some common etiological factor, possibly a tendency to a defective blood vascular system that is associated with the production of all these abnormal structures. The animal at the left of Fig. 3 is a litter mate of the fetus described above and is of interest in showing a well-marked, heavy hemorrhagic lesion involving a considerable portion of the left hind foot. There is a middorsal and smaller left lumbar lesion as well. I believe that an embryonic foot lesion similar to the one illustrated in Fig. 3 may produce one or more structural defects in later life, but the following suggestions must be taken merely as suggestions and not as demonstrable facts. If the area of extravasation is slight and involves only the superficial cutaneous layers, then a partial or complete syndactylism may occur. Lesions involving the deeper muscular and tendon areas are likely to produce, by natural reparative processes initiated for their re-

Fig. 3.—These embryos were 8 mm. in length when killed *in utero*. Their parents both showed hereditary abnormalities. The animal at the right shows a well marked hemorrhage in the region of the left eye and another apparently older lesion in the left lumbar area. The animal at the left is of interest in showing, in addition to two lesions of the back, a well marked hemorrhage involving the left hind foot.

moval, more extreme alterations in the adult structures of the limbs. This may account for the relative frequency of club feet in the experimental strains. The radiograph in Fig. 4 shows the hind limbs of a male animal from the defective lines. The right limb at the left of the illustration is club-shaped and markedly flexed, but the abnormality is mainly of the soft parts of the foot, while the bones are all present although distorted in position. The other limb shows the presence of an extra toe. The tendency to abnormal limb production is very marked in some animals. In certain cases two, three, or even all the limbs of a single animal may be club-shaped.

3. *Visceral Disturbances.*—Animals from the defective eye and club foot strains have shown over seventy-five cases of congenital kidney abnormality. This condition has not been found in the control animals. The kidney may be from slightly, to partially, to completely missing on one side of the body. When the kidney abnormality is purposely accentuated in a given family by breeding from animals with such abnormality, then a certain number of their young will be found at birth with congenital absence of both kidneys. They live only for a day or two with

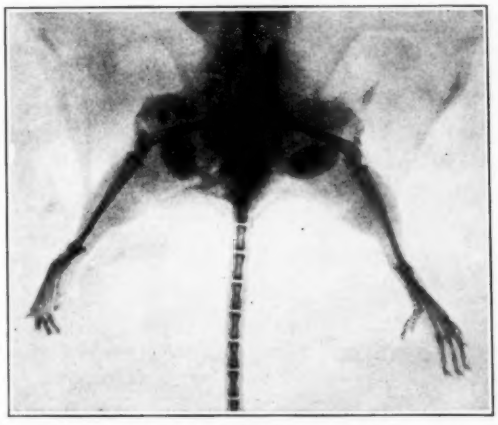

Fig. 4.—This radiograph shows the hind limbs of an animal with hereditary eye defects. One limb shows a marked club-foot condition and the other polydactylism.

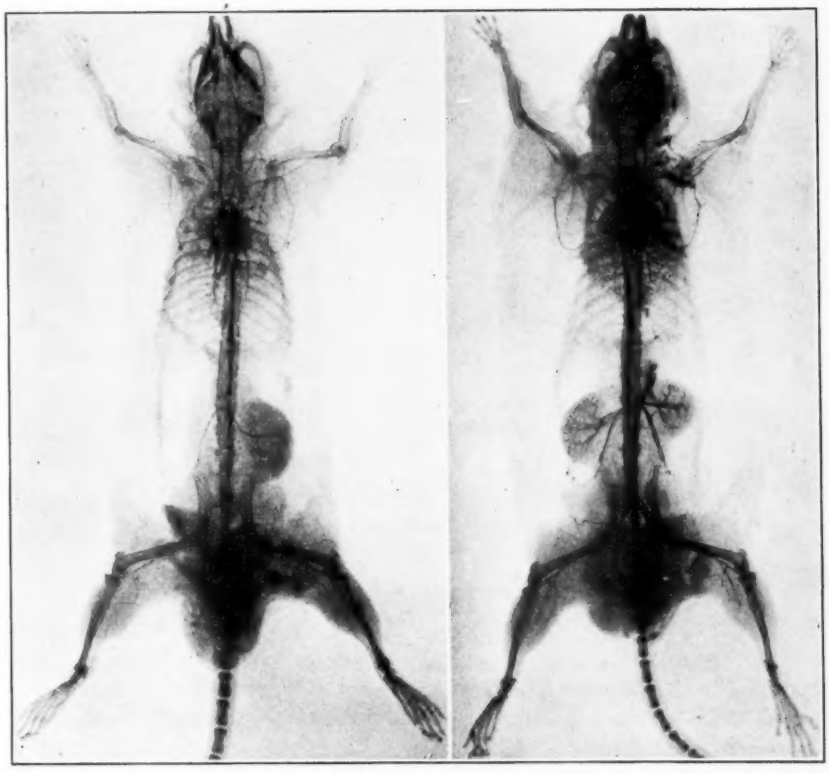

Fig. 5.—Radiographs of two animals with the arterial systems injected with an opaque solution to show the blood supply to the kidneys. At the left an animal is shown with complete congenital absence of the right kidney. The normal position of the kidneys is shown in the illustration at the right, but the animal in this case shows as well a club foot of the left hind limb.

this condition. The radiograph of Fig. 5 represents two animals with the arterial systems injected with an opaque solution. The animals were photographed from a ventral view so that the images are reversed in the illustration. The animal at the left shows the complete absence of the right kidney. The animal at the right shows the normal position of the two kidneys. This animal, however, has a club foot of the left hind limb. In a few instances actual hematoma and traces of hemorrhage have been seen in the kidney region of embryos examined *in utero* or just at birth, and the writer suggests that the blood vascular disturbance with an accompanying ar-

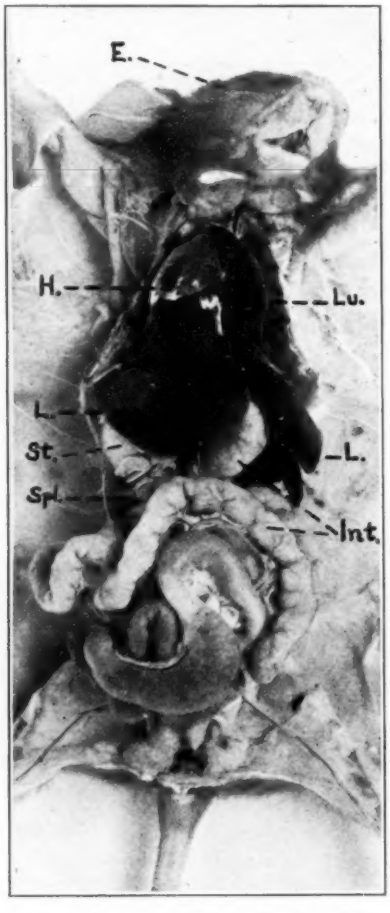

Fig. 6.—Situs inversus viscerum associated with hereditary eye defects. *E* indicates the complete absence of the right eye.

rest in development was possibly associated with the absence or malformation of the kidneys in these experimental animals.

Another visceral disturbance associated with hereditary eye abnormalities is *situs inversus viscerum*. Only a single individual has so far been observed. This abnormality is exceedingly rare in laboratory animals, and is of present interest because of the possibility that the same factor or factors that produced the hereditary defects in my experimental stock may have some relation in this instance to the transposition of the viscera. If there is some such causal relationship, the disturbance

must have occurred very early in fetal development. A ventral view of this animal is shown in Fig. 6. It was killed when full grown. The head has been drawn forward to show the complete absence of the right eye. The heart, liver, stomach, spleen and intestines are all shown in the transposed position.

4. *Association of Defects.*—Pedigree 1 of Chart I shows the sixth and seventh generations of one of the abnormal lines from the irradiated strains. It will be well

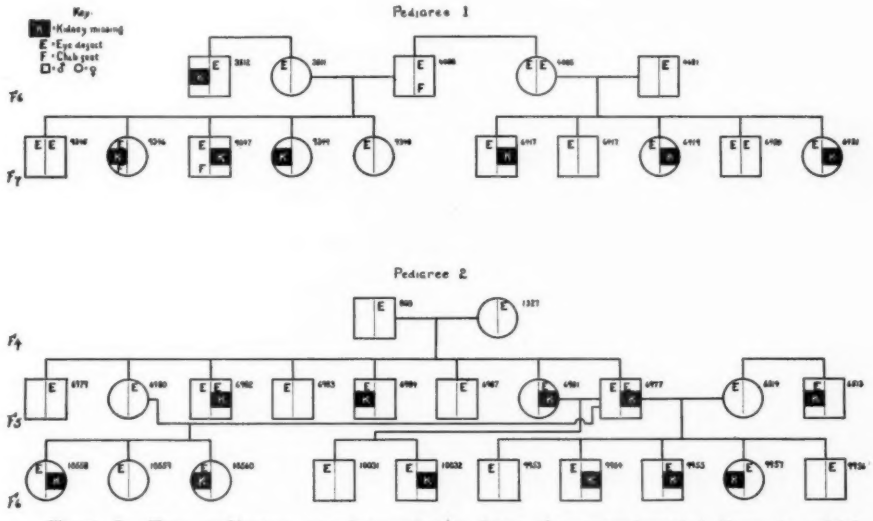

Chart I.—Two pedigrees are here shown from the experimental lines in which pronounced hereditary defects are present. Pedigree *1* gives only a small portion of the sixth and seventh generations and pedigree *2*, a portion of the fourth to sixth generations. (For further reference see text.)

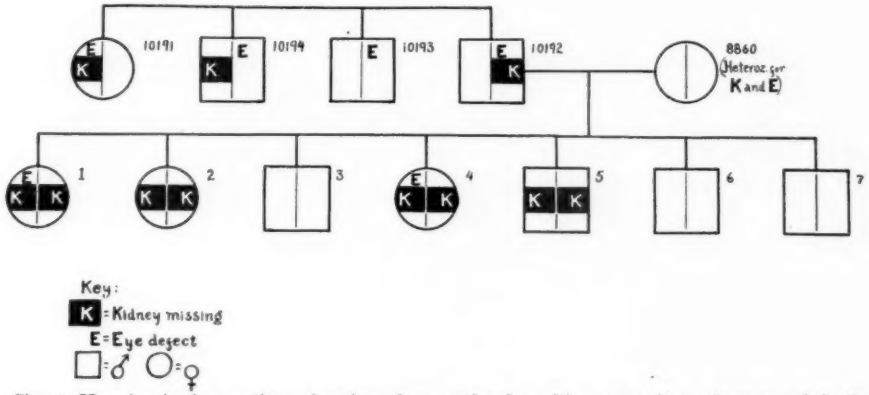

Chart II.—A single mating showing four animals with congenital absence of both kidneys.

to recall here that none of these animals were themselves irradiated. The irradiation was limited to the parents of the first generation. The squares represent males and the circles females. The vertical lines in the center of these symbols are shown to differentiate the right and left sides of the body. Consecutive pedigree numbers 9345, 9346, etc., indicate that the animals are litter mates. The letters E, F, and K represent eye, foot and kidney abnormalities respectively. It will thus be seen that male 9347 was a seventh generation animal, blind in the left eye, with a missing

right kidney and a left hind foot club-shaped. An examination of the two pedigrees of Chart I shows very convincingly the close association of the various defects I have described.

Chart II is of interest in showing a single litter, Nos. 1 to 7 inclusive, where one parent, male 10192, was blind in the right eye and had a missing kidney on the same side of the body. He was mated with female 8860 who was apparently normal but was genetically heterozygous for the eye and kidney defects. Four of their offspring, (Nos. 1, 2, 4 and 5), showed congenital absence of both kidneys. Nos. 1 and 2 were stillborn, but Nos. 4 and 5 were alive and active when killed about 24 hours after parturition.

DISCUSSION

One will note the prominence given in the experimental work above to the association of structural defects with arrested development coupled with blood vascular disturbances. A general tendency to abnormal structure associated with such disturbance (possibly poor blood vascular endothelium or other conditions of the blood vessels) is consistent with the marked tendency to the association of defects noted in my experimental animals.

The local area of blood vascular extravasation, if it occurs at a critical developmental period of any organ, may interfere with the normal differentiation processes, probably by depressing the rate of development as suggested by Stockard, and consequently that part of the body is never able to reach its normal degree of structure. The eyes are often affected in the animals of the experimental stock because for some unknown reason the blood vessels of the head (especially those in the eye region) are readily prone to extravasations during early intrauterine life.

Similarly blood vascular lesions in the region of the extremities of the limbs occur frequently and are associated with club feet and syndactylism. But entire organs may be modified, such as the kidneys, and their development partially or wholly suppressed, and certain data suggest that blood vascular disturbances are also operative here as well.

Several writers have recorded the presence of blood vascular extravasations in newborn children.[8, 9, 10] Many of such lesions, especially in the head region, may be traced to birth injuries either due directly to instrumentation at delivery or to pelvic pressure and partial asphyxia and increased blood pressure during parturition. But similar hemorrhages have been found in children examined *in utero* (cesarean section) before the usual birth traumata have occurred,[11] and the presence of congenital nevi, etc., indicate that blood vascular disturbances in many instances have taken place some time in the prenatal period. Clinicians usually attribute club feet either to a faulty position in the uterus, or to a diseased condition of the cerebrospinal axis associated with paralysis and malformation of the affected limb. My study of the development of abnormal structure throws no light upon

either of these views. If the true club foot condition is of the nature of an arrested development, it would appear that the so-called abnormal position of the limb while in the uterus was a secondary feature of a more profound embryonic disturbance that occurred fairly early in prenatal life. In this regard, in addition to the theories stated above, I would call attention to the possibility that early prenatal localized blood vascular disturbances may be associated with disturbance in the development of the eye and even with the suppression of an entire visceral organ.

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(*For discussion see page* 229.)

NATURAL IMMUNITY IN THE NEWBORN

BY LUTHER K. MUSSELMAN, M.D., NEW HAVEN, CONN.

PART II

IN a previous paper* it was shown that the maternal serum possesses a greater bactericidal action than the serum of the newborn. Likewise, the content of complement is greater in the maternal serum, although there is no evident parallel relationship between the two properties. As the sera of men, nonpregnant women, and women in the various months of pregnancy exhibit approximately the same bactericidal value as the sera of women at delivery, it is obvious that the sera of the newborn have a low bactericidal action. This paper will consider the various methods by which the normally low potency of the sera of the newborn may attain the adult value.

The marked difference in the bactericidal values of the sera of mother and newborn child is only temporary, as indicated by the results of the two cases examined later in the puerperium. In these cases (16 and 17) there was a marked increase in the bactericidal value of the sera of both infants, but the values of the maternal sera remained practically constant (Chart 3, see page 51, July issue).

As previously stated, natural passive immunity may be acquired either by placental interchange of preformed antibodies or by the transmission of antibodies through the colostrum and milk or by means

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of both agencies. The results of the series of cases examined indicate that, if it exists, the placental transmission of preformed antibodies from mother to fetus plays a very small rôle; otherwise, the bactericidal values of the two sera would approximate each other. Before considering the rôle which colostrum and milk may play in the transfer of antibodies from mother to offspring, it will be of interest to consider the various antibodies which different workers have found in these fluids.

I. Agglutinins.—This antibody has been found in the colostrum or milk of women who had typhoid fever prior to conception, during pregnancy, or in the puerperium (Achard and Bensaude,[2] Kasel and Mann,[53] Mossé and Daunic,[70] Löhr[65]). Schumacher[95] found the titer of agglutinins in the milk of a woman who developed typhoid fever in the last month of pregnancy to be equal to that of the maternal serum. Schenk[90] found agglutinins in the milk of 16 out of 28 parturient women, while v. Zubrzycki and Wolfsgruber[109] found both hemolytic and bacterial agglutinins in milk. The latter investigators believed that the content of agglutinins varied, since a greater amount of normal agglutinins was present in the specimens obtained on the first day after delivery than later in the puerperium. They showed that the hemagglutinin content of milk from primiparous women was higher and persisted longer than that of the milk of multiparous women. Hemagglutinins have been found in the milk of animals (Kraus,[57] Schumacher,[93] Reymann[80]). Little and Orcutt[64] found a higher titer of agglutinins for B. abortus in colostrum than in the blood serum of the cow.

II. Opsonins.—v. Eisler and Sohma[32] found the content of opsonin in the milk of immunized animals to be very high, when contrasted with the content of opsonin in the milk of normal animals. Tunnicliff[101] found opsonin in normal colostrum and milk, but the values were less than those of the maternal serum.

III. Cytolysins.—*(A) Bacteriolysins.*—Moro[67] was unable to demonstrate any bactericidal property in either human or cows' milk. On the other hand, Schenk[90] believed that human milk possessed a bactericidal action, but to demonstrate this, from 1 to 2 c.c. of milk was necessary. No bactericidal action was observed against any organism other than B. typhosus. The milk did not cause a complete destruction of the bacillus as the blood serum did, but seemed only to inhibit its growth. v. Fellenberg and Döll[35] believed that normal bacteriolysins were not transmitted to the infant through the milk.

(B) Hemolysins.—Bertino[9] showed that rabbits which were immunized before conception failed to transmit hemolysin to their young through the milk. Famulener[34] found that if goats were immunized during pregnancy, the titer of the colostrum might often be higher than that of the blood serum; that the hemolysin disappeared rapidly from the milk; that the immunization of the mother after the birth of the young did not result in any transfer of this antibody to the suckling kids; and that a high degree of immunization probably was necessary before the antibody would appear in the milk. Howell and Eby[49] believed, in view of the diminished value of the maternal rabbit serum after delivery, that the antibodies were given out in the colostrum and milk, and suggested that this might be "a possible cause for postpartum infections." Wegelius[105] was unable to find any transmission of antihemolysins in milk.

IV. Complement.—Pfaundler and Moro[75] found a substance in milk which acted like complement in that it caused hemolysis, while Kopf,[56] using their method, concluded that milk did not possess any complement. Bauer and Sassenhagen[6] believed that complement was present only in cows' milk in cases where there was a

mastitis, while the latter investigator[87] concluded subsequently that complement was present in the colostrum of cows and goats, but disappeared as lactation developed. With one exception Lane-Claypon[62] found complement in specimens of cows' milk. Kolff and Noeggerath[55] claimed that human colostrum and milk contained no appreciable amount of hemolytic complement and no bactericidal complement. Hewlett and Revis[46] found a complement-like substance in colostrum and milk, but they were unwilling to consider it as true complement.

Obviously, there are the same differences of opinion regarding the transfer of antibodies in the milk, as are held regarding the placental interchange of antibodies. It may be that one species of animal will transmit both natural and acquired antibodies through the colostrum and milk, while another species will not. It does not necessarily follow because animals transmit antibodies to their offspring in the milk that a similar transfer takes place in man.

In view of the conflicting results in reference to the content of preformed antibodies in colostrum and milk, it was desirable to test the bactericidal action of these fluids.

I. The Determination of the Bactericidal Action of Human Colostrum and Milk

(A) Technic:

(a) *Method of securing and preparing specimens.*—Colostrum was obtained by a breast pump from four mothers at intervals varying from 24 to 72 hours after delivery, while milk was obtained from two mothers on the fourth and fifth days postpartum. The specimens of colostrum were passed through a Mandler filter. As the whole milk would not pass through the filter, it was centrifugalized, the fat layer removed, and the remainder subjected to filtration. Subsequent tests showed the filtrates of both colostrum and milk to be free of bacteria.

(b) *Method of performing the test.*—The bactericidal action of the four specimens of colostrum and of the two specimens of milk were carried out in the manner outlined under the determination of the bactericidal action of the sera of mother and newborn.

In view of the fact that the colostrum and milk were subjected to filtration, the question may be raised whether this procedure had not removed, either by filtration or absorption, the antibodies that might have been present. To eliminate this possible factor, three specimens of colostrum were tested in the following manner:

The specimens, as obtained, were mixed with equal parts of culture dilutions, the ends of the capillary looped pipettes were sealed, and placed in the water-bath at 37°C. for three hours. Upon removing them, the pipettes were inserted in a 10 per cent solution of carbolic acid for 20 minutes; the ends were then dried in sterile gauze and broken. The contents were plated out on Endo media, and at the end of 48 hours, colony counts were made, thus making it possible to differentiate B. typhosus from any contaminating organisms which might be present.

(B) Abstract of cases (Tables I, II and III)

(See pages 54 and 58, July issue.)

(a) Colostrum
Case 19
Case 20 —See Chart 4 (page 57, July issue)
Case 21
Case 22

(b) Milk
Case 18 —See Chart 4
Case 23

TABLE III

CASE	GRAVIDA	DURATION OF LABOR	DELIVERY	ANESTHETIC	CHILD SEX	BIRTHWEIGHT	WEIGHT ON DISCHARGE	REMARKS
		hours				gm.	gm.	
37	5	6	Spontaneous	Lt. chloroform	F	2800	2835	Thyroidectomy
38	1	8½	"	"	F	3415	3480	in 1912
39	2	7½	"	"	F	3755	3800	

Case 15.—The specimen of colostrum was obtained on the second day postpartum. The mixtures of colostrum and various culture dilutions were plated out on Endo media. Colony counts showed 75 colonies of B. typhosus in the culture dilution of $\frac{1}{2,621,440}$, while there were 40 colonies in the culture dilution of $\frac{1}{5,242,880}$.

Case 37.—The specimen of colostrum was obtained on the second day postpartum. The mixtures of colostrum and various culture dilutions were plated out on Endo media. Colony counts showed 47 colonies of B. typhosus in the culture dilution of $\frac{1}{2,621,440}$, while there were 20 colonies in the culture dilution $\frac{1}{5,242,880}$.

Case 38.—The specimen of colostrum was obtained on the third day postpartum. The mixtures of colostrum and various culture dilutions were plated out on Endo media. Colony counts showed 40 colonies of B. typhosus in the culture dilution of $\frac{1}{2,621,440}$, and in the culture dilution of $\frac{1}{5,242,880}$ there were 25 colonies.

C. Summary of results.—One specimen of colostrum showed permanent inhibition of bacterial growth in the culture dilution of $\frac{1}{1,310,720}$, one in the culture dilution of $\frac{1}{5,242,880}$, one in the culture dilution of $\frac{1}{20,971,520}$, and one exhibited this property in the culture dilution of $\frac{1}{83,886,080}$. The two specimens of milk failed to show inhibition of bacterial growth even in the culture dilution of $\frac{1}{83,886,080}$ The specimens of colostrum which were not passed through the Mandler filter showed from 20 to 40 colonies of B. typhosus in the culture dilution of $\frac{1}{5,242,880}$ It would appear that colostrum and milk have little if any bactericidal action for B. typhosus. Possibly the results which were obtained in the high dilutions are an expression of bacteriostatic action of the diluted culture, rather than a true bactericidal effect.

The results of the bactericidal action of colostrum and milk indicate that they do not play an important rôle in transferring normal antibodies from mother to offspring. Permanent inhibition of bacterial growth was shown by the colostrum only in culture dilutions from 13 to 20 times greater than those in which the maternal sera were effective.

II. Complement Titrations upon Human Colostrum and Milk

The evidence indicates that the low bactericidal value of the serum of the newborn is not due solely to a lack of complement, and that as colostrum and milk have little or no bactericidal action, their ingestion is not responsible directly for an increase in the bactericidal value of the serum of the infant. In view of the fact that colostrum and milk might contain complementing activating substances, complement titrations were made on various specimens.

A. Technic. (a) *Method.*—The same method was followed as that outlined under complement titrations on sera of mother and newborn. The colostrum and milk were not diluted for the titrations. As the resulting mixtures were not clear, it was necessary to centrifugalize the tubes and sediment the cells, to see if any hemolysis was produced. As no hemolysis was observed, the results indicate that the amount of complement in the specimens was either very slight, or was absent. In order to detect minimal amounts of complement in the colostrum or milk, titrations were made in which colostrum and milk were added in varying amounts to a hemolytic system in which there was a sublytic quantity of guinea pig complement. If the colostrum or milk contained a very small amount of complement, they should intensify the action of the sublytic quantity of guinea pig complement and produce hemolysis.

B. Experimental findings.—

CASE 11.—The specimen of colostrum was obtained on the second day postpartum.

TUBE	AMBOC. 1 unit	CELLS 2.5%	COLOSTRUM	SALINE	HEMOLYSIS
1	0.4 c.c.	0.5 c.c.	0.1 c.c.	1.5 c.c.	0
2	0.4	0.5	0.2	1.4	0
3	0.4	0.5	0.4	1.2	0
4	0.4	0.5	0.6	1.0	0
5	...	0.5	0.6	1.4	0

CASE 37.—The specimen of colostrum was obtained on the second day postpartum.

TUBE	AMBOC. 1 unit	CELLS 2.5%	COLOSTRUM	SALINE	HEMOLYSIS
1	0.4 c.c.	0.5 c.c.	0.1 c.c.	1.5 c.c.	0
2	0.4	0.5	0.2	1.4	0
3	0.4	0.5	0.4	1.2	0
4	0.4	0.5	0.6	1.0	0
5	...	0.5	0.6	1.4	0

Titration with the addition of a sublytic quantity of guinea pig complement.

TUBE	AMBOC. 1 unit	COMPLEMENT 1 unit = 0.15 c.c.	CELLS 2.5%	COLOSTRUM	SALINE	HEMOLYSIS
1	0.4 c.c.	0.1 c.c.	0.5 c.c.	0.1 c.c.	1.4 c.c.	+
2	0.4	0.1	0.5	0.2	1.3	0
3	0.4	0.1	0.5	0.4	1.1	0
4	0.4	0.1	0.5	0.6	0.9	0
5	0.4	0.1	0.5	0.8	0.7	0
6	0.4	0.1	0.5	...	1.5	+++

CASE 39.—The specimen of colostrum was obtained on the third day postpartum.

TUBE	AMBOC. 1 unit	CELLS 2.5%	COLOSTRUM	SALINE	HEMOLYSIS
1	0.4 c.c.	0.5 c.c.	0.1 c.c.	1.5 c.c.	0
2	0.4	0.5	0.2	1.4	0
3	0.4	0.5	0.4	1.2	0
4	0.4	0.5	0.6	1.0	0
5	...	0.5	0.6	1.4	0

Titration of colostrum with the addition of a sublytic quantity of guinea pig complement.

TUBE	AMBOC. 1 unit	COMPLEMENT 1 unit = 0.15 c.c.	CELLS 2.5%	COLOSTRUM	SALINE	HEMOLYSIS
1	0.4 c.c.	0.1 c.c.	0.5 c.c.	0.1 c.c.	1.4 c.c.	+
2	0.4	0.1	0.5	0.2	1.3	0
3	0.4	0.1	0.5	0.4	1.1	0
4	0.4	0.1	0.5	0.6	0.9	0
5	0.4	0.1	0.5	0.8	0.7	0
6	0.4	0.1	0.5	...	1.5	++

CASE 15.—The specimen of colostrum was obtained on the third day postpartum.

TUBE	AMBOC. 1 unit	COMPLEMENT 1 unit = 0.15 c.c.	CELLS 2.5%	COLOSTRUM	SALINE	HEMOLYSIS
1	0.4 c.c.	0.08 c.c.	0.5 c.c.	0.1 c.c.	1.42 c.c.	+
2	0.4	0.08	0.5	0.2	1.32	+
3	0.4	0.08	0.5	0.3	1.22	0
4	0.4	0.08	0.5	0.4	1.12	0
5	...	....	0.5	0.4	1.6	0
6	0.4	0.08	0.5	...	1.52	+++

CASE 8.—The specimen of milk was obtained on the tenth day postpartum.

TUBE	AMBOC. 1 unit	COMPLEMENT 1 unit = 0.15 c.c.	CELLS 2.5%	MILK	SALINE	HEMOLYSIS
1	0.4 c.c.	0.1 c.c.	0.5 c.c.	0.1 c.c.	1.4 c.c.	0
2	0.4	0.1	0.5	0.2	1.3	0
3	0.4	0.1	0.5	0.4	1.1	0
4	0.4	0.1	0.5	0.6	0.9	0
5	0.4	0.1	0.5	0.8	0.7	0
6	0.4	0.1	0.5	...	1.5	++

CASE 15.—The specimen of milk was obtained on the tenth day postpartum.

TUBE	AMBOC. 1 unit	COMPLEMENT 1 unit = 0.15 c.c.	CELLS 2.5%	MILK	SALINE	HEMOLYSIS
1	0.4 c.c.	0.1 c.c.	0.5 c.c.	0.1 c.c.	1.4 c.c.	0
2	0.4	0.1	0.5	0.2	1.3	0
3	0.4	0.1	0.5	0.3	1.2	0
4	0.4	0.1	0.5	0.4	1.1	0
5	0.4	0.1	0.5	...	1.5	+++

CASE 39.—The specimen of milk was obtained on the tenth day postpartum.

TUBE	AMBOC. 1 unit	COMPLEMENT 1 unit = 0.15 c.c.	CELLS 2.5%	MILK	SALINE	HEMOLYSIS
1	0.4 c.c.	0.1 c.c.	0.5 c.c.	0.1 c.c.	1.4 c.c.	0
2	0.4	0.1	0.5	0.2	1.3	0
3	0.4	0.1	0.5	0.4	1.1	0
4	0.4	0.1	0.5	0.6	0.9	0
5	0.4	0.1	0.5	0.8	0.7	0
6	0.4	0.1	0.5	...	1.5	+++

C. Summary of results.—Three specimens of colostrum failed to cause hemolysis when mixed with a unit of amboceptor and red blood cells. Nor was hemolysis observed with three specimens of colostrum and three specimens of milk in similar mixtures to which a sublytic quantity of guinea pig complement was added, although this quantity of complement was capable of causing partial hemolysis in the absence of colostrum and milk. In some instances, very small amounts of

colostrum and milk failed to inhibit hemolysis completely. These results indicate that colostrum and milk contain an anticomplementary substance which is present in a quantity sufficient to mask the action of any complement that might be present in these fluids.

III. Inactivation of the Serum, Colostrum and Milk with Experiments to Determine if the Bactericidal Action Depends upon a Thermolabile or a Thermostabile Antibody.

A. Technic. (a) *Method of securing and preparing the specimens.*—The blood serum used was a portion of that secured for the bactericidal tests. The colostrum and milk were passed through the Mandler filter. The serum of the rabbits was obtained directly from the heart. By heating in the water-bath at 56°C. for thirty minutes, the specimens were inactivated.

(b) *Method of performing the test.*—The same procedure was used as that previously outlined.

B. Experimental findings.—(See chart 5, page 59, July issue.)

C. Summary of results.—The addition of native serum to the inactivated sera of mother and infant resulted in an increase of the bactericidal values of both sera, but the values were not equal. When native colostrum or milk was added in equal parts to native serum, a lowering of the bactericidal value of the serum resulted. When native colostrum or milk was added in equal parts to inactivated serum there was, except in one case, a decrease in the bactericidal value of the serum. When inactivated colostrum or milk was added to inactivated serum, no end point of bactericidal action was obtained. These results indicate that the bactericidal action of the serum is dependent upon a thermostabile antibody whose activity is increased by the presence of complement.

DISCUSSION

While it is recognized that natural species and racial immunity is inherited, there is no conclusive evidence that this is true for natural individual immunity. On the other hand, it must be admitted that under certain circumstances susceptibility may be inherited, as indicated by the work of Cooke and Vander Veer,[21] relative to the inheritance of protein idiosyncrasy.

It is of advantage to consider the various possible ways in which an infant might develop an immunity. These possibilities may be arranged as follows: (1) true inheritance through germ plasm; (2) placental interchange of preformed antibodies, of an activating substance or of an antigen; (3) ingestion of colostrum and milk in which there may be preformed antibodies, activating substance or an antigen; (4) development of antibodies by the infant itself, independent of the mother (growth mechanism).

The experimental work of Ehrlich with mice, which were immunized against abrin, ricin and robin, demonstrated that there is no actual inheritance of immunity. Immunized males were unable to transmit any immunity to their offspring. The immunity in the offspring was regarded as passive immunity through intrauterine transfer of antibodies and through suckling.

The results of the determinations of the bactericidal values of the

sera of mother and newborn indicate clearly that there is not a free placental interchange of antibodies from mother to fetus. It appears that the antibody possesses a structure which will not permit its diffusion through the placental barrier, or its selective absorption.

While most investigators believe the action of the placental partition can be explained by the mechanistic hypothesis, there are some findings which support the vitalistic theory. Edelstein and Ylppö[25] found the sodium content of the newborn blood to be greater than the maternal; their results with potassium varied, but in the majority of instances the newborn was higher than the maternal. They believed the mechanism of the placenta could be explained on the basis of a vital cellular activity. Scherenziss[91] had previously called attention to the variance in sodium content of maternal and fetal blood, but he found that the fetal blood was poorer in potassium, and that the chlorides which were not bound with sodium and potassium were considerably less in the fetal blood. Veit[103] found differences in the freezing point of the maternal and newborn sera, but equal values were shown by Krönig and Füth.[60]

In reference to the nitrogenous constituents of maternal and newborn blood, Morse[69] has shown that the newborn has a higher content of amino-acid nitrogen than the maternal; Slemons and Bogert[95] found practically the same value of urea in the blood of mother and newborn; equal values for creatin and creatinin were found by Hunter and Campbell[51] and by Plass.[76] Morriss[68] found that in 19 cases the maternal blood was richer in blood sugar than the blood of the newborn, while in 5 cases the values were equal. Slemons[96] found higher values for fat, cholesterol and lecithin in the maternal blood, and concluded that the fetus synthesized fat from the glucose which the mother furnished. Howe and Givens[47] concluded that diffusion offered the most reasonable explanation for the passage of nutrient material and waste products through the placenta.

Howe[48] showed that newborn calves are lacking in euglobulin, which is a fraction of serum globulin with which antibodies are believed to be associated. Lewis and Wells[63] and later Boyd[12] found that a newborn infant was likewise lacking in euglobulin. But they concluded that the offspring when fed colostrum showed a higher value of euglobulin than those artificially fed, for colostrum is rich in euglobulin, the only blood protein secreted in colostrum.

In 1908, Pfaundler[74] reviewed the experimental data on the transmission of both natural and induced antibodies from mother to child. In a few cases, induced antibodies were found to have passed through the placenta. He concluded that it was not a physiologic function of the placenta to transmit antibodies from mother to child and, as the maternal serum is always of a higher value than that of the newborn,

it seems quite likely that these views are correct. On the other hand, it is impossible to rule out the placental interchange so long as bactericidal action is demonstrated by the serum of the newborn. It is conceivable that inorganic salts would diffuse through the placenta, while some organic constituents would not. However, as we believe that the material which builds up bone, cartilage, etc., in the fetus passes through the placental barrier in some other form than that in which it is later seen, may it not be true, also, for antibodies? The fetus is provided by the mother with the requisite substances for development, but the antibodies are formed by the fetal tissues. We can conclude that if there is a placental interchange of preformed antibody, it is restricted, or the values would approximate one another.

It is possible that there may be a placental interchange of an activating substance or an antigen. The former possibility is purely hypothetical, but the latter is known to take place. In view of the fact that these cases were tested against B. typhosus and that none of the cases gave any history of a typhoid infection, it is highly improbable that any typhoid protein passed through the placenta into the fetal circulation.

The result of the experiments with human colostrum and milk shows that colostrum has little or no bactericidal action, that milk has none, and that colostrum and milk do not contain any complement but are anticomplementary. These facts are not in accord with the idea suggested by Famulener,[34] who in view of his experimental results in animals, concluded that the ingestion of colostrum would increase the antibody content of the serum of children. Smith and Little[97] pointed out the importance of colostrum to newborn calves, but made no deductions for man.

Does human colostrum or milk contain an activating substance? Thus far, only one serologic activating substance has been found to exist in the body fluids, and that is complement. In the specimens of human colostrum and milk that were examined an anticomplementary substance was found which masked the action of any complement that might have been present. While it seems improbable that human colostrum or milk contains an activating substance, yet this possibility cannot be excluded as a source by which natural immunity may be developed.

If human colostrum and milk do not contain preformed antibodies or an activating substance, the only other way in which these fluids might directly influence the development of an immunity would be by their containing antigen. As the serum of the newborn has a bactericidal action against organisms such as the cholera vibrio, and as cholera is not endemic, it would seem that the normal antibody in the serum is not specific for one organism. Moreover, the serum of the

newborn has a lytic action against the red blood cells of heterologous species. It is very improbable that a specific antigen for such an antibody passed through the placental filter or was conveyed to the infant through the milk. Hence it is not probable that human colostrum or milk directly influence the infant in its development of immunity.

From the present investigations it seems warranted to conclude that the serum of the newborn possesses an antibody content lower than the mother; that placental interchange of antibodies, if it exists, plays a very minor rôle in transferring antibodies to the fetus; and that human colostrum and milk do not contain normal antibodies as measured by the bactericidal test.

This does not mean that one should advocate artificial feeding in preference to breast feeding, for it seems reasonable to believe that breast feeding, by affording better nutrition to the infant, results in the formation of a higher antibody content. This viewpoint was suggested by the work of Moro.[67] Although he was unable to find any bactericidal action in either human or cows' milk, he showed that if infants were breast fed for two weeks and then artificially fed for two weeks, there was a lowering of the bactericidal action of the infants' serum from 75.8 to 40.7 per cent. Both Wassermann[104] and Römer[84] concluded that the serum of breast-fed infants possessed a stronger bactericidal action than the serum of artificially fed infants.

Accepting the fact that milk may contain artificial antibodies, it does not necessarily follow that they will be of any value to the nursing child. Schumacher[93] reported the case of a mother who developed typhoid fever towards the end of pregnancy. At birth the infant's serum showed an agglutination titer of 1/10 the value of the maternal serum. On the eighty-third day of life, the infant's serum failed to show any agglutinins for the typhoid bacillus, although it had been nursing, and the milk and blood serum of the mother were equal in their value of agglutinins. Achard and Bensaude[2] showed that an infant, nursed by a mother who had developed typhoid fever in the puerperium and whose milk contained agglutinins, failed to show agglutinins in its serum. Although v. Zubrzycki and Wolfsgruber[109] found normal hemagglutinins in milk, they were unable to demonstrate them in infants breast fed for two weeks, and concluded that the infant either failed to absorb the hemagglutinins or that they were destroyed by the process of digestion. This is in contrast to the opinion of Famulener[34] who believed that kids absorbed antibodies from the colostrum of immunized goats. Smith and Little[97] believed that "there appears to be no function inherent in colostrum which controls development or growth, or which is essential to the starting of the mechanism of digestion, since calves not having had colostrum appear to do as well as the others, when the infection has been over-

come.'' Gheorghin[40] reported an epidemic of pneumonia among guinea pigs. The mothers were vaccinated and no new cases developed among them, but there were 25 deaths out of 27 nursing young. It is not known if there were any antibodies in the milk of these animals; obviously, if they were present, they were of no value to the young. Kirstein[54] showed that, if pregnant women were given diphtheria toxin-antitoxin mixtures, the newborn possessed a high content of antitoxin in their sera. However, these children would contract diphtheria in about the same frequency as children of nonimmunized mothers. He concluded that the newborn child was unable to utilize the antitoxin present in the blood; and that this was substantiated by the clinical observation that often antitoxin injections in the newborn are without any curative effect. While Kuttner and Ratner[61] found small amounts of diphtheria antitoxin in human colostrum, it was much less than that in the maternal or cord blood. No antitoxin was found in human milk. They reported 18 cases in which the infants never received any colostrum and no abnormality was noted in their development. Hence, it seems that the value of colostrum to the newborn child is not that of a protective mechanism such as is seen in the newborn calf.

Smith and Wason,[98] by maintaining rats on a deficiency diet that caused rickets, found that there was a lowering of the bactericidal action of their serum. Future investigations may reveal whether it is possible to vary the resistance of man to disease by variations in diet.

It seems probable that the rôle of human colostrum and milk is an indirect one, namely, that it maintains the infant in a better state of nutrition than is usually found in the artificially fed infant, thus enabling the tissues to develop a higher degree of resistance.

It is obvious that the factors by which resistance is measured are less in the newborn than in the adult. There is no evidence to warrant the assumption that this deficiency is made up by a transfer of antibodies from the mother through the milk. On the other hand, the evidence indicates that the newborn is entirely independent of the mother in regard to its formation of antibodies. They are formed, probably, in a manner similar to that which controls the growth of the infant.

SUMMARY AND CONCLUSIONS

1. The bactericidal action of human maternal serum is always greater than that of the newborn.

2. The content of complement is likewise greater in the maternal serum than in that of the newborn.

3. Although the maternal serum contains more complement and exhibits a stronger bactericidal action than the serum of the newborn, there is no evident parallel relationship between the two properties.

4. Pregnancy in itself is not responsible for the increased effectiveness of the maternal serum; the difference in the bactericidal values of the sera of mother and newborn is due to an actual deficiency in the serum of the latter.

5. Human colostrum and milk have very little, if any, bactericidal action. They possess an anticomplementary substance which masks the action of any complement that may exist in them.

6. The bactericidal action of serum is not dependent upon complement alone, but its activity is greatly increased by it.

7. These results indicate that the infant is only partially, if at all, dependent upon its mother for the development of normal antibodies, or of natural immunity.

I desire to acknowledge my indebtedness to Dr. George H. Smith for suggestions regarding the serologic methods employed.

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YALE UNIVERSITY MEDICAL SCHOOL.

PAINLESS CHILDBIRTH BY SYNERGISTIC METHODS (SECOND PAPER)*

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THE first paper on this method for inducing painless labor appeared in the American Journal of Obstetrics and Gynecology, of October, 1923, detailing a little over 100 cases and stating the conditions and circumstances under which the method was evolved. Since that time we have had nearly 200 additional cases, making about 300 in all.

Other methods require either an expert anesthetist or are admittedly justified only in specially equipped institutions and not in private practice or even in ordinary hospitals. The synergistic method is so simple and requires so little attention after administration that it can be used in an entirely empirical manner by any physician acquainted with the technic either in the home or the hospital. At first we used ten different ingredients, but one of these and then another has been discarded until today we rely almost entirely upon two drugs for the major effect, that is, magnesium sulphate and ether. The former is given by hypodermic injection, the ether mixed with oil is administered through the colon. We changed the formula over nineteen times, but have now standardized the technic and no change has been made in the last 100 cases.

The technic calls for from one to three hypodermics and one rectal instillation. The first hypodermic is given at the same time as is usual with the Freiburg method, "after labor is well on its way, when the pains are four or five minutes apart, and lasting thirty or more seconds." The first hypodermic consists of one-sixth of a grain of morphine dissolved in 2 c.c. of a 50 per cent solution of magnesium sulphate, and no morphine is given later. The rectal instillation is two and a half ounces of ether with ten grains of quinine hydrobromate in two drams of alcohol, with enough olive oil to make four ounces. Thus the doctor or nurse comes in contact with the patient only four times at the most, and often only twice. The magnesium sulphate is in 2 c.c. ampoules of 50 per cent strength. If the first hypodermic has a marked sedative effect, the instillation is delayed possibly one to two hours; but if not, it is given within fifteen to twenty minutes. As is usual with any retention enema, the patient should be lying comfortably on the left side, the catheter inserted four inches within the rectum, and from three to ten minutes taken

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for the instillation, then the catheter is quietly withdrawn. The synergistic effect of the drugs is usually noted within fifteen minutes, the patient becoming very quiet and sometimes sleeping. An exhausted woman may even be lightly anesthetized, but analgesia with unconsciousness is the ideal sought.

The effect continues for about four hours, but if insufficient, one or two additional hypodermics of 2 c.c. 50 per cent magnesium sulphate deepens the effect. Pain is eliminated, contractions continue, labor is not delayed, and the memory of events is either clouded or completely obliterated. Sometimes no anesthetic is needed even when the head is passing over the perineum, neither is a supplement required for an episiotomy or repair of lacerations or other necessary work. The mother may not be aware of the birth until told. As with all drugs or systems, the effect varies with the individual patient, her confidence in the doctor, maintenance of quiet, gentle manipulations, etc. On the other hand, loud talking, rattling of pans, and thoughtlessness in other ways will mar what might under other circumstances be an ideal result.

Other methods of giving these drugs have been attempted or may be developed in the future, but no method could possibly be safer or simpler. After each attempt at improvement, we have returned to the technic described. Before proceeding further it might be well to state some reasons for our implicit confidence in its safety:

(1) Four drams of the salts of magnesium sulphate have been given subcutaneously, without deleterious effects, over 200 times at the Presbyterian Hospital[1] of this city. In order to give this amount with our present technic, we would have to administer sixteen hypodermics of 2 c.c. of a 50 per cent solution. We are now using only three hypodermics. Unless chemically pure and sterilized, magnesium sulphate solutions rapidly deteriorate. The ampoules are safe.

(2) Oil-ether colonic anesthesia is used as a routine in many hospitals, the amount of ether varying from four to six ounces—the average being five ounces. We use only one-half as much, or two and one-half ounces.†

(3) Quinine may possibly be given more advantageously by mouth or intramuscularly, or it may be omitted entirely. This will be determined in due course. For simplicity and convenience the present technic will be continued. If increased to 30 grains, toxic effects may follow, including headache, tinnitus, etc.

(4) The small amount of morphine used is not considered dangerous.

(5) The resultant effect of this combination of drugs is a state

†Mucus, saliva, nausea, vomiting, and gas pains are usually absent with ether by rectum. As a 50 per cent solution of ether in oil kills the colon bacillus in ten minutes, the possibility of postnatal infection from this source is practically eliminated.

of analgesia with unconsciousness, which is as safe as local analgesia and much better than a third degree surgical anesthesia.

(6) The baby usually cries when born. It is the exception to have delayed respiration. This is in marked contrast to scopolamine-morphine analgesia, where there is usually more or less delayed respiration and it is exceptional for the baby to cry immediately.

(7) Labor is not delayed, and a high degree of efficiency is obtained.

Before detailing the results with the standard technic, it may be well to relate our experiences with other methods. During the period from September 1, 1923, to January 1, 1924, Drs. McKenzie and Hudson, house surgeons at the Lying-In Hospital, gave most satisfactory cooperation in the development of this technic. Living in the hospital—each case at all times under direct supervision—their observations and notes are therefore valuable.

Oral Administration of Ether.—The ether was given to 22 cases by oral administration; the magnesium sulphate, by hypodermic. The formula used contained

℞	Ether	drams iv
	Parafin oil	drams vi
	Aqua menth. pip.	M v

The patient is allowed to take approximately an ounce of port wine slowly, holding in the mouth so as to establish the aroma and taste; this is immediately followed by the ether mixture, patient first inhaling deeply, all of it being quickly swallowed, the remainder of the wine then being given to clear away the taste and odor of the ether. The patient is urged to keep quiet for ten or fifteen minutes to prevent nausea. The magnesium sulphate injections are given thirty minutes before or at the time of the oral administration of the ether mixture. Only those case were chosen where no disproportion existed between the size of the pelvis and fetus, and which promised to make normal progress. The doses were given when the patient was well into labor and when the cervix was from two to four fingers' dilated. In about one-third of the cases the injection of $MgSO_4$ was repeated after one hour. The mixture was not retained in three cases. Three cases received morphine sulphate, gr. 1/6 in the solution of $MgSO_4$. Fourteen showed a definite sedative effect from the magnesium sulphate-ether combination. Excitement, or symptoms of mild intoxication, was noted after fifteen to twenty minutes in three cases.

Uterine contractions seemed unaffected in nineteen cases; increased in nine; and decreased in two.

Sensation of pain was decreased in eleven; increased in none; not affected in eleven.

There was slight cyanosis of the child in four cases; delayed respiration (one to three minutes) in two.

In the series, no variation from the usual amount of postpartum bleeding was noted.

The fact that there was slight cyanosis in four cases and delayed respiration (one to three minutes) in two, out of a total of twenty-five cases, would seem to indicate that ether by mouth is more dangerous to the fetus than when given through the colon. Compared to this, McKenzie states that "no danger to the fetus was recognized"

in a series of 73 cases. Ether by inhalation is probably also more dangerous to the fetus, since it affects the higher cerebral centers to a much greater extent than when given by the colon. For example, under colonic anesthesia it is not unusual to converse with a patient undergoing an operation for excision of upper or lower jaw, complete excision of breast or any other radical and painful operation. The brain is never as free to coordinate under inhalation ether as with colonic.

From this limited number of cases, we believe there is shown a definite analgesic and moderate sedative effect from the combined action of ether and magnesium sulphate, with a tendency to shorten the first stage of labor by allowing more rapid dilatation of the cervix—and this without detrimental effects to child or mother.

Some means of prolonging the effect would be advantageous, according to Hudson. We now know that the effect would be prolonged by additional (two or three) hypodermics of magnesium sulphate. However as results did not compare with the standard the oral method was dropped.

Normal Saline Instillation.—The technic used in the next series is based upon the fact that one quart of normal saline given by rectum one hour before operation is a good prophylactic measure where shock, especially from hemorrhage, is expected.[2] Also, all authorities are agreed that the parturient woman accumulates a certain amount of blood over and above that normally in the body, exclusive of the weight of the hypertrophied uterus and its contents. The thought occurs that, when a woman comes to term and labor ceases for a more or less indefinite time, Nature has failed to provide this extra amount of blood in anticipation of a great loss, and so labor automatically ceases. If this theory is correct, by supplying a patient with the necessary amount of fluid in the form of normal saline, and at the same time administering analgesics to abolish the element of fear, the woman should proceed with labor. Certainly neither mother nor child would be injured by the procedure, and both should be helped. The following formulæ were used: No. 1. Urea 1 per cent, $MgSO_4$ 6 per cent, Distilled Water q.s. ad. 4 ozs. No. 2. Ether 2½ oz., Glucose 1 oz., Water 1 quart. (Ether in solution 7½ per cent.)

Dr. Hudson's notes follow:

Report of cases in which a 6 per cent solution of ether in water was given by Murphy drip with the intention of causing stimulation of uterine contractions or, where no pains were present, of inducing labor. The Murphy drip was begun after the lower bowel had been thoroughly cleansed by soap suds enema. The average time required for administration of the one quart mixture was two hours and twenty-five minutes. The usual time for administering one quart for surgical cases is twenty minutes..

CLASS A. Case 2, para ii, had pains before admission to hospital, but no pains after coming in. Started Murphy drip one hour and twenty minutes later; cervix

hard, one and one-half fingers' dilated. Given $MgSO_4$ (25 per cent solution) 2 c.c. Patient becoming restless, with pains in the back, two hours and forty-five minutes after starting; repeated $MgSO_4$ and added morphine, gr. ¼. Eight P. M. (three hours, five minutes after starting) gave orally mixture of oil, ether, and port wine. This was not retained. At 9 P. M. (four hours, five minutes) cervix five fingers' dilated and soft. Normal delivery at 9:45 (four hours, fifty minutes after starting). Child showed slight cyanosis and respirations were delayed a short time (50 seconds). Moderate amount of bleeding. Uterine contractions strong and regular. The mixture was poorly absorbed, so patient really took only about one pint of the ether-saline mixture.

CLASS A. Case 3, para i, had labor pains early in the morning, but these subsided about 11:00 A. M.

11:50 A. M. gave morphine, gr. ⅛ in $MgSO_4$ 25 per cent. Cervix at this time was thick, two fingers' dilated.

12:15, started Murphy drip. Patient restless after two hours. Expelled much of solution, but went on with labor.

8 P. M. pains strong and regular, but cervix dilating poorly (three and a half fingers).

10:50 P. M. given morphine, gr. ⅛ (hypo).

Delivery normal at 1:00 A. M., twelve hours and forty-five minutes after starting rectal instillation. Baby's condition good.

CLASS B. Case 4, para ii, having occasional slight pain. Cervix at this time was thick, two fingers' dilated.

12:10 P. M., started Murphy drip. No immediate result noted. Small portion expelled.

3:40 P. M., magnesium sulphate, 25 per cent solution. No sedative effect seen, but uterine contractions became regular and strong by 8:00 P. M. Patient very noisy and difficult to control; results were difficult to determine.

Normal delivery at 10:50 P. M.,—about eleven hours. Conditions good; normal amount of third stage bleeding.

CLASS B. Case 5, para i. Pains regular and fairly strong when rectal instillation was begun (4:55 P. M.). Cervix two fingers' and thin. After thirty minutes, tube was removed and a small amount of the mixture expelled. For two hours a slight sedative effect was noted, the patient remaining stuporous; after this period the contractions became normally severe, with the usual amount of pain. Delivery normal at 11:30 (seven hours). Baby crying.

Case 6, para v. No pains or uterine contractions: cervix soft, one and a half fingers' dilated. Murphy drip given, requiring one hour and fifteen minutes, at the end of which period patient was drowsy. Slept at intervals and had no uterine contractions or pains. This condition lasted for two hours. Was up about the ward the following day, and discharged from hospital until labor pains might begin. Supposedly full term patient. This case is important,—if any conclusions may be drawn from one case:—inasmuch as the method is not an abortifacient, and unless full term has been reached the technic is unimportant.

This last mixture has not been given in a sufficient number of cases to enable us to draw any definite conclusions. Theoretically, it is the most logically correct of the three methods here outlined.

Magnesium Sulphate Injections.—Five cases were given injections of magnesium sulphate only. At the time when pains were strong and the cervix three fingers' dilated—two c.c of a 25 per cent solution in three cases, and 2 c.c. of a 50 per cent solution in two cases.

Some analgesic effect was noted in all, being slight in two cases and sedative in three. No effect seen on the uterine contractions; no detrimental effects noted on babies. Morphine sulphate, grs. 1/6, was included in one of the injections of 25 per cent solution.

Whenever morphine has been given to cases in labor it has been given in 2 c.c. of a 25 per cent solution of magnesium sulphate, since the action seems definitely prolonged by this combination.

At the same time that these procedures were being carried out, the standard technic was being used on another class of patients with uniform success. This formula consisted of:

℞			
	Quinine hydrobromide	grs.	10
	Alcohol	drams	2
	Ether	ozs.	2½
	Oil	oz.	1

On September 1 a change was made in the formula, just as the House Staff changed. A series of mishaps occurred; patients became boisterous and had to be restrained, but there were no accidents to mother or child.

About this time, at McKenzie's suggestion, we decided to grade all patients "A," "B," "C," or "D," so that we could more intelligently change the formula or technic.

Key to Tabulation.—A favorable result is listed in the tables as "A." Sedative effect less complete or not so prolonged is classed "B". Those cases in which patients fail to lose themselves in sleep but feel senses clouded and know pain less acutely are grouped as "C". The poor results, i. e., where effect is negligible or where complications ensue have been designated "D". McKenzie's notes follow tabulation.

Formula No. 1

Quinine Hydrobromide		gr.	15	Total 9 cases
Alcohol		drams	3	
Ether		ozs.	3	
Oil	q. s.	ozs.	5	

The results with this mixture were so uniformly unfortunate that its use was discontinued after trial in nine cases. In seven of these cases marked excitement followed the injection. Cerebral stimulation and extreme restlessness proved quite alarming and altogether unsatisfactory. Memory for events during these periods was wiped out, however. The patients recalled nothing of their labor, although reminiscent in some cases of the shouting and singing to which they gave themselves. Two of the cases in this group gave excellent results—prolonged sedative effect and complete loss of memory.

Case No. 4, 85463, Results "D", Formula No. 1.

Administration	3:00 Initial hypo. (Morph. gr. 1/8-Mag. Sulph. 25%)
	3:45 Rectal Instillation
	4:30 Hypo Mag. Sulph.
	5:30 Hypo Mag. Sulph. and Morph. gr. 1/8
	11:00 Delivery

Slight sedative effect with marked excitement and vomiting. Administration O. K. Discarded formula.

Large, muscular young woman, para i, hard dry labor, great apprehension. No appreciable effect from preliminary hypodermic of morphine and magnesium sulphate. Instillation well retained. Patient became almost immediately talkative and disoriented. For three hours, periods of quiet alternated with restlessness and mental stimulation (singing and talking). Vomiting occurred several times. Normal second stage; patient not difficult to control. Chloroform given during last half hour. Baby O. K.

In order to correct the excitement stage, the formula was weakened in every way; formula and McKenzie's notes follow:

Formula No. 2

Quinine hydrobromide	gr.	5	Total 16 cases
Alcohol	drams	2	
Ether	ozs.	2	
Oil q. s.	ozs.	4	

Note: This mixture employed in sixteen cases gave unsatisfactory results in the majority of instances. Very slight sedative effect in many cases with increased annoyance to the patient, and a tendency to undue excitation caused this formula to be discarded.

	A	*B*	*C*	*D*	
Primip.	3	2	4	2	16 cases, No. 2 formula
Multip.	1	1	2	1	
Total	4	3	6	3	

Factors having a tendency to cause excitement would be a too rapid injection of the instillation, air forced into the colon, inability of the patient to understand English or to appreciate the objective desired. A third change was now made, also a return to the gravity method of instillation—the syringe used only when indicated, i.e., when the gravity method was impractical.

Formula No. 3 (now in use in all Cases)

Quinine hydrobromide	gr.	10	
Alcohol	drams	2	
Ether	ozs.	2½	
Oil q. s.	ozs.	4	

	A	*B*	*C*	*D*	
Primip.	26	8	1	1	45 cases, No. 3 formula
Multip.	4	4	1		
Total	30	12	2	1	

Case No. 1, 85923, result "B," formula No. 3.

Initial hypo (Morph. gr. ⅙ and Mag. Sulph.) at 7:15
Rectal Instillation 7:30
Hypos of Mag. Sulph. at 8, 9, 10 and 11

Patient an intelligent Danish girl, para i. Instruction and later questioning conducted through interpreter. Pains frequent and severe, cervix 3 fingers', thick, soft. Morphine given 15 minutes before instillation. Patient complained of burning in rectum but retained the injection. Sleep did not follow as in most cases.

Patient restless, with pain and vomited a number of times. Behavior in second stage good. Spontaneous delivery six hours after instillation.

Upon questioning on day after labor patient states that she felt contractions but knew little pain. Felt as if in a daze, impressions indistinct, remembers vomiting and hypodermic injection vaguely. Was conscious even during labor of relief by treatment and remains very grateful.

CASE No. 2, 83942, result "A," formula No. 3.

5:00 P. M. Hypo Morph. gr. ⅛ Mag. Sulph. 50 per cent c.c.
7:00 P. M. Rectal Instillation
7:30 P. M. Hypo Morph. gr. ⅛ Mag. Sulph. 2 c.c.
11:00 P. M. Hypo Mag. Sulph. 2 c.c.
12:00 M. Delivery

Young colored woman, para i, dry labor. Strong, frequent pains through afternoon, cervix only 2 fingers' and thick. At 7 P. M. instillation given. Immediate sedative effect, patient sleeping quietly then for four hours. At this time began to stir and groan with pain until in a short while caput appeared at perineum. Spontaneous delivery in 5 hours after instillation. Small amount of ether given. Patient very grateful for analgesia afforded. Remembers indistinctly strong bearing down pains just before ether given. States that early pains of dilation before injection were most trying part of whole labor.

CASE No. 3, 85560, result "A," formula No. 3.

4:00 A. M. Rectal Instillation
4:10 A. M. Hypo Morph. gr. ⅛ Mag. Sulph. 50 per cent 2 c.c.
9:00 A. M. Delivery

Turkish woman speaking no English. Instillation given as soon as patient was admitted and examined. Patient obviously suffering great pain, particularly in the back. Cervix 2-3 fingers'. Hypodermic given immediately after instillation. Patient went to sleep, remained very quiet for three hours, although at one time when disturbed for examination was well oriented. After three hours hard bearing down pains began, patient made no outcry, pushed very well, and dozed between contractions. A little chloroform given to retard progress while head delivered. Delivery five hours after instillation.

Administration.—Selection of cases is of utmost importance as well as time of treatment. The ideal case, a primipara with cervix rigid, firm, 2-3 fingers, having strong frequent contractions and distressed with pain and fear can, of course, be only approximated in most instances. Adequate cooperation on the part of the woman in labor involving first, proper comprehension of purposes of treatment and second, the measure of control to insure its success, frequently cannot be obtained. In fact the results tabulated as noted have been obtained in a remarkably diverse collection of patients often incapable of receiving any instruction, and with the instillation analgesia employed at such varied stages in the course of labor as circumstances and individual peculiarity made possible.

The synergistic principle previously stressed has not been neglected and further reliance is placed on subcutaneous injection of magnesium sulphate solution as experience demonstrates its value. It might be mentioned at this point that 50 per cent magnesium sulphate employed in the last 25 cases has shown its desirability over the less concentrated solution.

A preliminary hypodermic of morphine sulphate grains ⅛ or ⅙, dissolved in 2 c.c. of 25 per cent or 50 per cent magnesium sulphate is almost invariably employed, and serves well to lessen the patient's discomfort and dull sensibilities otherwise somewhat aroused by the rectal injection. The instillation is given one-half to one hour

later with the patient in bed, removed whenever possible from distracting sights and sounds. The attitude assumed by patient lying on left side with hips somewhat elevated is conducive to comfort as well as favoring absorption of injection. Utmost importance is attached to elimination of fecal material from the rectum, a cleansing enema being frequently necessary before the instillation is given. Care is taken to introduce the ether and oil slowly without inclusion of bubbles of air. The gravity method is used where the fluid runs in easily, although some pressure with barrel of syringe is often necessary. Patients complain only of brief slight burning in rectum. In only three cases—not included in series here reported—has the mixture been expelled in whole or in part.

Where good effect follows instillation no further medication need be given. In not a single instance among 200 cases has the method come under suspicion, neither has the life of the mother or child been jeopardized. It is now being used (formula No. 3) in the Out-Patient Department. If successful here, it will prove our hypothesis that the method is so simple that it can be used anywhere, by any physician, and in an empirical manner.

General Impression of Results (McKenzie): "To all observers, an impression of real benefit to patients is apparent. The contrast between a restless, apprehensive woman suffering acutely with continual backache and sharp recurring pains, tired out also by her early efforts at dilatation of the cervix and the quiet sleeping, or drowsy, unworried patient stirring only when contractions occur, is striking. There are no offensive dreams and rarely any untoward cerebral excitement to mark the period of stupor immediately following instillation. In the ideal case the patient remains sleeping or quiet for about four hours, proceeding then to pick up the task of labor with renewed strength and uncomplaining vigor. She appears refreshed, no longer apprehensive, and oftentimes retains her drowsiness through a severe second stage and delivery. In a number of instances labor has progressed so rapidly that the head descends to the perineum without appreciation by patient. In the larger number of cases a fairly normal sensation in second stage of labor is anticipated.

Progress in labor is not retarded.—The cervix softens more rapidly under influence of analgesic injection and pains succeeding upon periods of apparent inactivity are stronger and more effective by reason of the rest afforded patient.

No danger to the fetus has been recognized.

This method must not be confused with oil-ether anesthesia, as a comparison between the synergistic method and the colonic, as used by Thaler and Huber for the same purpose, that is painless childbirth, will readily show. In Thaler and Huber's series, using only the oil-ether, the dose was repeated twice in 25 cases, three times in 20 cases, four times in 15 cases and five times in 12 cases; 88 cases received an average of 3-3¾ ounces of ether, and one case received as much as 7½ ounces of ether. With the synergists, the injection is never repeated. The total amount, 2½ ounces, is never exceeded. The reduced amount of ether is explained by the synergizing of the magnesium sulphate with the ether.

In using the synergistic method for painless childbirth, we utilize to the fullest extent the analgesic properties of ether. We can get the cooperation of the patient if desired. In private practice, where the practitioner has the full confidence of the patient and the cooperation

would be 100 per cent, the synergistic method would be much more satisfactory and efficient than in any hospital ward service.

Looking forward, we may state that by judiciously modifying and combining the three methods outlined—oral, colonic, Murphy drip—we hope not only to have normal labor painless from commencement to the completion of whatever repairs may be necessary but also to be able within certain limits, to control the time of delivery by what may be considered physiologic methods. For the present: the standard technic of three hypodermics and one instillation is simple, safe and efficient.

REFERENCE

(1) Jour. Am. Med. Ass'n., August 6, 1921, vol. 77, pp. 421-23.
(2) Wells, Am. Jour. Surg., July, 1923.

40 EAST FORTY-FIRST STREET. (*For discussion see page* 238.)

END RESULTS AFTER OPERATIONS IN 53 CASES OF UTERINE PROLAPSE*

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THIS study of prolapsus uteri is based on 53 cases operated upon by myself during five years beginning 1915, many of which have been under observation over five years.

Passive and active causes for prolapsus uteri are described. Among the passive causes the following conditions are enumerated, which favor a descensus of the uterus: (a) faults in the perineum; (b) in the vaginal walls; (c) in the uterine ligaments; (d) in the cellular tissue; and (e) in the pelvis.

An intact female perineum with normal function, gives support to the female pelvic organs indirectly during moments of increased intraabdominal tension, such as coughing, sneezing and lifting. Muscular contraction of the perineum guards and supports the pelvic organs from undue tension. This function of the perineum is Nature's prophylactic measure against prolapsus uteri, although prolapsus occurs with intact perinei.

A lacerated perineum favors descent of the uterus, nevertheless a complete prolapse of the uterus with a complete tear of the perineum is quite rare.

Complete laceration of the perineum usually occurs during labor in those cases where there is a short transverse diameter of the pelvic outlet. The rami of the pubes in forming a less obtuse angle at the

*Read at a meeting of the New York Obstetrical Society, Feb. 12, 1924.

symphysis protects from injury the fascia of the anterior wall of the vagina and the fascial layer of the cardinal ligaments by the oncoming head of the baby. On the other hand, with a more obtuse angle of the rami of the pubes, the fetal head in labor traumatizes and lacerates the fascial support of the bladder and uterus and the occurrence of prolapsus uteri is favored.

To what extent the faulty conditions in the vaginal wall, cellular tissue, and pelvic bones favor the occurrence of a procidentia is more of an academic interest than practical value.

Faulty conditions in the uterine ligaments are the chief cause in the production of procidentia uteri. By uterine ligaments not only the round ligaments, the broad ligaments and the utero-sacral ligaments are included but also those ligaments which include the pelvic fascia and the so-called cardinal ligaments. This leads not only to retroversion and retroflexion but to complete procidentia of the uterus and uterine adnexae and is by far the most important condition to be considered in dealing with the subject of the etiology of the uterine prolapse.

Increased intraabdominal pressure is the most important active causative factor in procidentia uteri. Long continued downward pressure of the pelvic contents may so weaken the pelvic diaphragm as to cause herniation of the pelvic organs. We therefore find procidentia more frequently in the working woman, and more frequently in the parous than the nulliparous woman.

By far the greatest number of prolapsus uteri are acquired. Childbirth is the great etiologic factor in causing uterine prolapse. With the uterine support gone, herniation of the female pelvic contents results. The degree of prolapse will depend upon the degree of destruction, which, of course, must necessarily vary with each individual case, because the forces operative in each labor must of necessity also vary. In some cases the initial prolapse occurs along the plane of the urinary bladder, as a result of a destruction of the fascial plane that gives support to the bladder. A cystocele develops first, as this viscus descends, it draws downwards other pelvic organs along their planes. In other cases the uterus retroverts and the cervix prolapses along its own plane and appears at the vulva. In still other cases at first a rectocele with a descensus of the cervix occurs. In a certain proportion of cases a herniation of all the female pelvic organs occurs, constituting the cases with a third degree of prolapsus uteri.

The 53 cases here reported have been divided into three classes:

1. Cases in which the prolapse developed after the first childbirth.
2. Cases in which the prolapse developed after two or more labors.
3. Cases in which the prolapse developed after the climacteric period.

Eleven cases, 21 per cent, had prolapse after one childbirth. The youngest was 23 and the oldest 55. There were as many cases that had instrumental deliveries as those that were delivered without any aid. In only one case was there a laceration through the sphincter ani, and in this case only a first degree of procidentia developed. This bears out the argument advanced before that when the sphincter tears, there is less injury sustained by the fascial layer under the bladder and cardinal ligaments and therefore procidentia is not so liable to develop. While the prolapse developed in the majority of these cases soon after the childbirth, in one case, No. 41, it did not occur until fifteen years later. This patient had well-developed ligaments, and had a complete prolapse at the age of 38.

In three of these eleven cases the ligaments were very poorly developed. It is probable that congenital prolapsus would have developed in these three cases even if they had not passed through childbirth. In one of these cases a second degree of prolapse developed six months after a normal labor. In the second case the prolapse went to the third degree and developed five months after an instrumental delivery. In the third case there was also an instrumental delivery but the prolapse developed only after two years.

In 21 cases, 39 per cent, the prolapse developed after two or more children, nine cases were instrumental and ten noninstrumental deliveries. (In two cases character of delivery was not stated.) It is a question to what extent instrumental deliveries are causative factors in procidentia uteri. In my total number of cases, 30 out of 51, or 59 per cent, had normal deliveries. The pelvic fascia, cardinal ligaments, in fact all of the supports of the female pelvic organs may suffer just as much injury or even destruction in a normal labor as during a forceps delivery. In fact a well-conducted forceps operation should result in very little, if any injury to the supports of the pelvic organs.

In 21 cases (39 per cent) prolapse developed after the climacteric period. The youngest patient in this series was forty and the oldest sixty years of age. Uterine prolapse, according to this report develops after the climacteric period just as frequently as during the childbearing period of life. On theoretical grounds prolapse should develop less frequently, because the tissues have involuted, there is less weight to the organs to be supported, and the tissues are less liable to yield to pressure. However, this is not the case judging from the above. In two cases, Nos. 12 and 48, the prolapse developed after the twelfth childbirth and in another case No. 5, the prolapse developed after the eleventh labor; in still another case, No. 53, after the ninth and in two cases, Nos. 31 and 52, after the eighth.

The various points brought out by the study of the 53 cases of prolapse here reported, are as follows:

1. That prolapse develops in 21 per cent of cases after the first childbirth, and that 72 per cent of the prolapse is of the third degree.

2. That in 39 per cent of cases the prolapse comes on after two or more children are born and that 71 per cent of the prolapse is of the third degree.

3. That prolapse develops during the climacteric period just as frequently as during the active childbearing period in 39 per cent of cases and that 76 per cent of the prolapse is of the third degree.

4. That instrumental deliveries appear to have no bearing on the cause of uterine prolapse as statistics show that there were as many prolapses in the noninstrumental deliveries as in the forceps deliveries.

The complications in the 53 cases were as follows: 5 had fibroids of the uterus, 3 ovarian cysts, 1 salpingitis, 3 hernias (one inguinal and two ventral), 1 rectovaginal fistula, 1 hemorrhoids, 1 retained secundines, and 1 myometritis.

There were 236 pathologic lesions in the 53 cases operated upon.

There were 216 operations performed on 53 cases. In 35 cases the cervix was amputated; 23 cases had the uterus interposed; 42 had an anterior colporrhaphy performed. The perineum was repaired in 50 cases although the records show that a laceration of the perineum was recorded in only 45 cases. I consider perineorrhaphy an essential step in every operation for procidentia. While the perineum does not give support to the uterus *per se*, it sustains the pelvic organs during moments of increased intraabdominal pressure. In 22 cases the uterosacral ligaments were shortened by a special method to be described later. Seven cases had a vaginal hysterectomy performed. In one case the abdomen had to be opened on account of uncontrollable hemorrhage from an anterior colporrhaphy.

The results of the operations on the 53 cases of procidentia were as follows: 27 cases were successful (75 per cent); 6 cases were partially successful (17 per cent); 2 cases died (3.7 per cent); 17 cases were not heard from. If the 6 cases of partial successes are included among the successful ones there is 97 per cent of successful operations. To thus include the partially successful cases with the successful ones is permissible because the procidentia was cured in every one of these cases and only part of the various operations performed were unsuccessful. Under these conditions the percentage of successful cases was 92.

Interposition was done 23 times, mostly on cases of procidentia developing after the climacteric period. It is an operation appropriately designed for this class of cases. There was one death in these 23 cases. Interposition is not a time-consuming operation and therefore lends itself to those cases of prolapse where a prolonged operation is not to be undertaken on account of the general condition of the patient. In the postclimacteric procidentia cases the uterus is

small, having undergone involution, and therefore the organ adapts itself to the operation. Some of my most grateful patients are old women who have been relieved of their procidentia by this simple but safe operation.

In three cases interposition was done in young women, Nos. 16, 18 and 23. These three patients were still in the child-bearing periods and the operation was chosen because it appeared to be best suited. In two, both tubes were also resected to insure sterility. In Case 23 the tubes were not resected, because the patient took the anesthesia very poorly and the operation had to be ended as quickly as possible. This patient had a stormy recovery but has remained well and cured of her procidentia. She has been under observation for five years.

In the 23 cases of interposition, 19 were entirely successful, the procidentia was relieved and the patients were entirely satisfied. Two cases are put down as partially satisfactory because they were not, strictly speaking, successes in every way. In one case the rectocele recurred and in one case the anterior wall of the vagina was shortened. Nevertheless in both of these cases the procidentia was relieved. One case died of gangrene of the left leg, a very rare complication, and strictly speaking it should not be charged up against the operation.

In four cases the prolapse was of the first degree only. In addition to the interposition, the uterosacral ligaments were also shortened by the vaginal route. In the light of experience it was unnecessary to burden the patient with this additional operation. The cases that were subjected to the interposition alone fared as well as those with shortening of the uterosacral ligaments. There were 2 cases with second degree prolapse and 17 cases with third degree of prolapse.

The end results of the operation show that 9 cases were not heard from after the operation, leaving 14 cases to be accounted for. Eleven cases were entirely successful. Two cases were partially successful. Eleven cases out of 14 gives 80 per cent of permanent cures, and as the 2 other cases of partial successes were also relieved of the prolapse, it is entirely permissible to say that 13 cases out of 14 were successful and therefore the percentage of cures was 93.

In two cases, Nos. 2 and 28, the rectocele recurred. In two, Nos. 26 and 41, the perineal operation was a failure and in two, Nos. 32 and 40, the anterior wall operation was a failure. In case No. 41 the perineum broke down after a childbirth subsequent to the operation.

One case, No. 33, was a failure. The cause of the failure was due to an error in surgical judgment. The circumstances were as follows: The patient had a complete prolapse, with eversion of the vaginal walls. The uterus had become pregnant in this prolapsed condition and the patient was suffering with an incomplete abortion. She had one child and was very anxious for a second. The patient also had a

very tender appendix which required removal. Nothing short of a vaginal hysterectomy and utilization of the broad ligaments, for the support of the vaginal prolapse, should have been considered in this case. Instead of a vaginal hysterectomy, the following operation was done. The uterus was curetted to clear it of the retained secundines and a week later the plastic operation done as well as the laparotomy for the removal of an infected appendix. Four months later the uterus completely prolapsed again. Abdominal shortening of the ligaments does not and cannot give permanent support to a uterus and adnexae that are in a state of complete prolapse. Looking back on the case, I believe that the following procedure should have been adopted. The uterus should have been curetted and the appendix removed at one sitting and a vaginal hysterectomy with the necessary plastic operation done at the second sitting. This case was successfully operated upon by me on April 4, 1922. A vaginal hysterectomy and plastic operation were done seven years after the first operation.

There were two deaths in this series, Nos. 19 and 22. Case 19 died of gangrene of the left leg—a very rare complication. The case was a poor surgical risk and should not have been operated at all. She was incapacitated by a third degree of prolapse, a rapid operation was decided upon on account of her general poor condition. The uterus was interposed and the perineum repaired. She recovered from the operation, developed a phlebitis and died with gangrene of the left leg.

The second case, No. 22, died of general peritonitis following a hysterectomy and plastic operation, a purely unavoidable death. The case was a good surgical risk in every way. The patient was 55 years old and had a complete prolapse.

Out of 53 operated cases, only 34, or 64 per cent, could be traced. Fifteen cases were observed for a period of from one year to five years, and nineteen for from one to eleven months.

The statistics here given of the 53 cases of procidentia uteri were carefully compiled and honestly presented. Two operations utilized in these cases, amputation of cervix and vaginal shortening of the uterosacral ligaments, are here described in detail.

AMPUTATION OF CERVIX

A circular incision is made around the cervix, at the junction of the normal mucous membrane of the vagina and the granulation tissue of the cervix or, where the mucous membrane joins the scar tissue of the laceration. The cervical tissue is laid bare of all mucous membrane, the large blood vessels severed are picked up individually and tied. By laying bare the cervix of all its attachments a very good cuff of mucous membrane is obtained. The cervix is now cut across at the internal os or at a lower point, depending upon the operator's desire to amputate

the cervix high up or lower down. The cervix having been amputated, the next step is to suture a flap of tissue of the mucous membrane of the vagina to the edge of the uterine canal to prevent stenosis. It is my practice to use six canal sutures, three above and three below.

In tying the sutures placed in the manner shown (Fig. 1) it is important to guard against strangulation of tissue by tight sutures. The loop pulls the vaginal mucous membrane into the canal of the uterus, but it should be tied so loosely that a space is left between the knot and the mucous membrane, sufficient to admit the point of an artery clamp. The other canal sutures will reinforce the loop of the first canal suture sufficiently to hold it in place. Tissue constriction should be avoided in every possible way as it leads to necrosis of tissue and interferes with

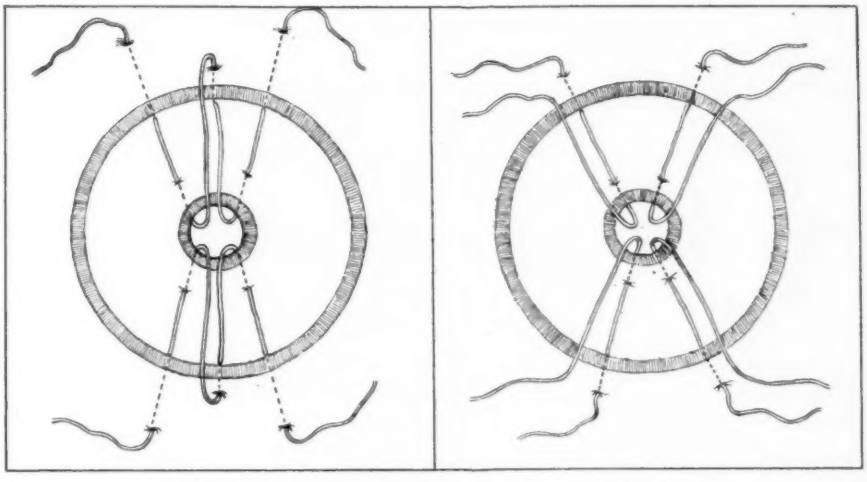

Fig. 1. Fig. 2.

Figs. 1 and 2.—Diagrammatic representation of amputated cervix, showing manner of inserting the primary sutures (Fig. 1) and the additional sutures (Fig. 2).

proper healing. Furthermore a cervix operation that heals by granulation is apt to leave a stenosis of the external os, and cause a great deal of scar formation. Necrosis of tissue due to tight sutures may cause secondary hemorrhages.

VAGINAL SHORTENING OF THE UTEROSACRAL LIGAMENTS

The fundus of the uterus is delivered into the vagina, as is done in the interposition operation. By pulling on the fundus uteri the uterosacral ligaments come into view and can be outlined. With a linen suture the edges of the uterosacral ligaments are picked up, about an inch and a half from their uterine insertion. A stab wound is now made beneath the broad ligament from the vagina into the peritoneal cavity, close to the cervix, on either side. Through these stab wounds are drawn the two linen sutures. It is to be noted that the linen suture in the right uterosacral ligament is brought out on the left side of the cervix and the suture in the left uterosacral ligament comes out on the right side of the cervix. The uterosacral ligaments are then drawn through the stab wound and sutured to the anterior surface of the cervix of the uterus. This procedure has the effect of pulling the cervix into the hollow of the sacrum. A very substantial support for the uterus is thus created. This operation was utilized in 24 of the cases here reported. The technic is comparatively easy. The ligament is not severed from

the uterus as in the Jellet operation. Should the uterosacral ligaments be short and not reach around the cervix, they can be sutured to the side of the cervix with equal success.

From the study of these cases of prolapse here presented and from practical experiences in dealing with procidentia, in its various phases, the conclusion has been reached that the first and second degrees of prolapse require practically the same surgical procedures. In a small number of cases of first degree of prolapse an elongation of the cervix with retrodisplacement of the uterus is the only pathologic condition that needs surgical correction. While these cases are not strictly speaking procidentia cases, from the patient's point, they are, because they produce the same symptoms. In this class of cases, we are apt to do too much plastic work, and subject the patient to unnecessary traumatism and morbidity. An amputation of the cervix with a perineorrhaphy brings about a very satisfactory and permanent result.

In the cases with second degree of prolapse, more extensive plastic work is called for to bring permanent relief to the patient. In these cases, an amputation of the cervix and a plastic operation on the anterior wall of the vagina for the cure of the cystocele is of great importance, which is to be combined with perineorrhaphy.

In the third degree of prolapse the problem is an entirely different one. These prolapse cases must be carefully studied to arrive at a proper conclusion as to what type of operation is best suited for the particular case. Shall the operation be one of a plastic nature alone or shall a hysterectomy also be done, or should the patient have an interposition operation? These three types of operations call for discrimination and consideration as to the physical condition of the patient. The age of the patient and social status are also of importance in the consideration of the type of operation to be advised for this particular case. Attention has already been called to the satisfactory results that were obtained with interposition in patients in the advanced period of life. In many cases nothing short of a vaginal hysterectomy will give results. A hysterectomy, however, has its morbidity and also its mortality, an important consideration in prolapsus uteri, as is shown in the statistics. Hysterectomy was performed seven times (13 per cent) in my series, and it is in these cases that a fatality occurred in a patient who was a very good surgical risk, and the operation was devoid of any technical difficulties. She stood the operation well and died of peritonitis. It was impossible to discover the source of the infection.

ANALYSIS OF OPERATIONS

Eight different operations were utilized to correct prolapse in my series. There were 27 operations performed in eight cases with first

degree of prolapse, making an average of 3⅜ operations for one case. Twenty-one operations were done in six cases with second degree of prolapse, making an average of 3⅞ operations for each patient. The 39 cases with third degree of prolapse had 141 operations performed, making an average of 3⅝ operations for each case. In the total number of cases, 189 operations were done, an average of 3⅝ operations for each case of prolapse. Sixty-six per cent of the patients had the cervix amputated; 79 per cent had an anterior colporrhaphy; 94 per cent had perineorrhaphy; 43 per cent had interposition; 41 per cent had the uterosacral ligaments shortened; 13 per cent had vaginal hysterectomy.

The same type of operation was used in each one of the three degrees of prolapse. In the cases with first degree of prolapse the anterior wall was operated on in 37 per cent of cases, while in the cases with third degree of prolapse this same operation was done in 89 per cent of the cases. The same is true of perineorrhaphy. In the first degree of prolapse it was done in 87 per cent of cases, in the third degree in 97 per cent. Interposition was done in the cases with first degree of prolapse, in 50 per cent, 33 per cent in the second degree and 43 per cent with third degree.

CONCLUSIONS

From the study of the 53 cases of prolapsus uteri here presented the following conclusions are justified:

1. That childbirth is the cause of prolapsus uteri.
2. That in 21 per cent of cases the prolapsus develops after the first childbirth and that in 72 per cent the prolapse is of the third degree.
3. That in 39 per cent of the cases the prolapse came on after two or more children were born, and that 71 of the cases had a prolapse of the third degree.
4. That instrumental deliveries appear to have no bearing on the cause of uterine prolapse. There were 41 per cent of instrumental deliveries as against 59 per cent of noninstrumental deliveries.
5. With the advance of the age of the patient, there is a progressive increase in the percentage of the number of the third degree of prolapse.
6. Complications are fairly frequent in procidentia uteri.
7. Operations are successful in 75 per cent of cases.
8. There is a morbidity and a mortality rate to be considered by the surgeon in operating for procidentia uteri.
9. Interposition is a useful operation in all of the three degrees of prolapse.
10. The same type of operation was used in the various degrees of prolapse.

40 EAST FORTY-FIRST STREET.

(*For discussion see page* 223.)

FURTHER OBSERVATIONS OF INTRACRANIAL HEMORRHAGE IN THE NEWBORN; SIGNIFICANCE OF YELLOW SPINAL FLUID AND OF JAUNDICE IN THESE CASES*

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A careful survey of the literature of conditions of intracranial hemorrhage in the newborn has revealed a keener interest in this subject within the past six years; with few exceptions, the majority of observations have been recorded by Americans and of the many contributions the pediatricians are apparently the specialized group most aware of this rather frequent complication of birth. It is true that the pathologists were the first to focus attention upon this serious condition in its clinical aspect and especially the milder degrees not resulting in the death of the patient. The neurologist rarely sees these patients in the acute stage and the orthopedist never, so that it is upon the obstetrician that the profession depends for the early diagnosis of the condition and its appropriate treatment.

The large intracranial hemorrhages in the newborn not only produce definite clinical signs but they usually end fatally within several days after birth, so that their recognition is comparatively a simple one; it is the mild cases, however, and the so-called "signless" ones that frequently escape an early diagnosis, only to be suspected months and years later if the hemorrhage has not been entirely absorbed. The chronic condition of cerebral spastic paralysis in its various forms associated with mental retardation need only be mentioned, as the treatment of the older patients can permit, at the most, an improvement only, and by no means a cure.

Although Mr. Little,[1] in 1862, first promulgated the theory of the definite relationship between intracranial hemorrhage at birth and cerebral spastic paralysis and McNutt,[2] in 1885, confirmed this opinion and placed the subject upon a firm basis by careful pathologic studies, yet no real advance in the clinical diagnosis was made until the last decade.

INFANTILE INTRACRANIAL ANATOMY

The newborn babe is so different from the adult in its cerebral anatomy as in other structures that it is not surprising that intracranial accidents occur rather frequently; in fact, it is amazing that the per-

*Presented at the Boston Obstetrical Society, Jan. 22, 1924.

centage of birth trauma is not higher than indicated by the statistics[3, 4] in these three series of cases—300 in all.

Brindeau,[5] Cushing[6] and others have observed that the number of supracortical veins running from the piaarachnoid to the sinuses are free and unsupported by any connective tissue or dural coverings, thereby rendering these vessels more liable to rupture; they are most numerous, in the parietal and frontal regions and are grouped in the immediate vicinity of the sutures, especially the frontoparietal and sagittal. The diplöe is absent until the second year of life. Browning has demonstrated that Pacchionian bodies are not present at birth and are a matter of postnatal development, probably not completed until about the twentieth year. The middle meningeal artery usually runs vertically up the squamosphenoidal suture instead of backward and it divides into three branches instead of only two. The Rolandic area lies adjacent and immediately posterior to the coronal suture and runs parallel with it. The fontanelles are covered with two main layers only—the skin and superficial fascia constituting one layer, and the other, the membranous interosseous layer, being composed of fused periosteum and dura, and it is impossible to separate them.

ETIOLOGY

There seems to be a consensus of opinion among investigators in this field that the cause of this condition can be attributed to one of the following main groups or to a combination of them: a. trauma, b. asphyxia or congestion, and c. blood disease of the newborn.

(a) In the traumatic class are grouped those cases of intracranial hemorrhage which result from the prolongation of labor due to some form of dystocia, whether it be maternal, fetal or placental in origin. (It is beyond the scope of this paper to consider the details of abnormal obstetrics and the reader is referred to any modern treatise on obstetrics to acquaint himself more fully with the factors concerned in the production of pathologic labor.) Too rapid a delivery such as a spontaneous or precipitate birth is also to be included in this etiologic group since the hastened uterine expulsion prevents the fetal head from adapting itself to the tremendous forces of uterine contractions; overriding of cranial bones occurs and severe lacerations of the veins entering the sinuses or of the sinuses themselves often result in the milder cases of intracranial hemorrhage. The more serious results, such as tentorial lacerations with hemorrhage, usually terminate in death. The use of forceps is a very important consideration, although in these series of 32 bloody cases out of 300 consecutive deliveries, forceps was responsible for the intracranial vascular lesion in only 6 cases, and of 28 forceps applications, 6 intracranial hemorrhages resulted—4 being due to medium and 2 to low forceps extractions.

Ehrenfest[7] claims that pituitrin is to be regarded as an important factor in the production of cerebral hemorrhage and he is substantiated and supported in this view by other observers—Lippman,[8] Sidbury,[9] Neff[10] and Porter[11]; he also believes that the various methods of resuscitation now employed are far too vigorous and hazardous for the well-being of the child that has had a difficult and abnormal entrance into the world and especially when the latent or dormant presence of an intracranial hemorrhage only too frequently exists concealed and signless; a small extravasation of blood occurring before or during birth, may easily become very markedly aggravated by many of the strenuous methods now in common practice. He is supported in this opinion by Conkey[12] who states that the vigorous methods of resuscitation should be mentioned prominently as a contributing etiologic factor in intracranial hemorrhage.

(b) Asphyxia as a cause of cerebral hemorrhage is present, not only in those cases of prolonged labor where the continued dilatation of the congested, enlarged and unsupported terminal vessels results in rupture, but also in those instances of interference with the fetal or placental circulation, such as occurs in pressure upon the umbilical cord, premature separation of the placenta, decreased placental blood supply due to an extremely contracted uterus, etc. Increased CO_2 in the blood is followed by an engorgement and an increased tension in the vessels; the delicate and unsupported venules and arterioles, unable to withstand further additional intravascular pressure, then rupture. The hemorrhage in the first two groups may occur during the process of moulding or of actual delivery itself and it may happen in the premature as well as in the mature child.

(c) Of the blood diseases as possible factors in cerebral hemorrhage of the newborn child, hemorrhagic disease of the newborn is preeminent and most frequent; syphilis, the toxemia of eclampsia and the so-called toxemia of pregnancy in the mother as a cause of intracranial hemorrhage in the newborn are comparatively rare. It does seem to us that hemorrhagic disease in the newborn has been overemphasized and especially so by the pathologist and by the pediatrician. In those cases where the signs of intracranial hemorrhage first make their appearance *after* the third day of life, it is very natural to consider them as being due to hemorrhagic disease of the newborn—provided the blood-clotting time is prolonged. This assumption tends to be confirmed by the findings of Rodda[13] that the blood-coagulation time in cases of hemorrhagic disease of the newborn begins to lengthen on and after the third day, although in rare cases it may be present as early as the sixth hour. We are, however, unable to substantiate our hypothesis at present with any clinical or pathologic data, because only one of the 32 bloody cases in these series of 300 consecutive newborn babies had a lengthened coagulation time. Conkey[12] also feels that

the theory of hemorrhagic disease of the newborn as a cause has been overstressed to the exclusion of the mechanical and traumatic factors that are present in both spontaneous and operative deliveries; he further states that obstetricians should not seize upon the diagnosis as a cloak to conceal intracranial birth injuries which result from obstetrical efforts.

OBSERVATIONS

It is important that the proper terminology be used in describing these cases, so that even when quoting authors, the word "symptom" (a subjective complaint) will always be replaced by the word "sign" (an objective finding).

It is interesting to note that the signs vary from none at all to the most severe ones—depending upon the size of the hemorrhage and upon the amount of cerebral edema present. In the reports of pathologists, one is liable to be misled into believing that each case of intracranial trauma evinces such marked signs of increased intracranial pressure that if one becomes acquainted with these various signs, then a diagnosis would be a very simple matter. The pathologist is correct in so judging from the material which he receives, only the fatal cases, and the records of the signs prior to death are naturally those found in terminal conditions of large lesions with all the classical signs of increased intracranial pressure and hemorrhage; it is the obstetrician and pediatrician, examining these cases earliest, who will recognize the initial acute signs.

Capon, in his pathologic study,[14] enumerates many signs, some of which occur early in the mild cases, but most of them are found in the very extensive intracranial hemorrhages and fatal cases. He has found that the normal, rosy pink color of the healthy newborn child is replaced by a bluish, asphyxial coloration, especially prominent upon the face and feet; the lips may be surrounded by a pallid zone, white rather than blue being the prevailing color in the more severe cases. In the majority of his cases, the respirations were shallow and the pulse slow and full; poor nursing and absence of the swallowing reflex were present in the severe examples; hemorrhages from the nasal and pharyngeal mucous membranes were observed. Unilateral or general spasms were also found. In the most extensive hemorrhages, nystagmus, ocular palsies, pupillary irregularities (anisocoria), convulsions, medullary and bulbar signs were observed.

This author, in a very careful pathologic study of the subject, states that the clinical signs of intracranial hemorrhage are present or develop shortly after birth. If the extravasation of blood has been large, his assumption is undoubtedly correct, but if the bleeding has been small it is our belief that no signs may be present at all—and yet the hemorrhage may be of sufficient amount to cause future cerebral impairment. If lumbar punctures had not been performed routinely in

these series, many of the signless hemorrhages and frequently the result of so-called normal, uncomplicated deliveries, would have been overlooked and the true intracranial condition would not have been recognized.

The signs, as outlined by Capon, no doubt exist in the cases of hemorrhage and cerebral edema which are severe enough to produce death; our study, however, has been a clinical one and of consecutive newborn babies—ascertaining the frequency of cerebral hemorrhage and cerebral edema of varying degrees where the signs were most frequently absent or only the faintest suspicion of their existence was present; where the lumbar puncture as a diagnostic procedure was essential and where, as a therapeutic measure, it relieved the acute condition.

Brady[15] offers the classification of supra- and infratentorial hemorrhages; Towne and Faber,[16] quoting Seitz, divide the cases into intraventricular, supra- and infratentorial hemorrhages. Brady bases his differentiation chiefly upon the presence of restlessness, insomnia, refusal to nurse and excessive or constant crying in supratentorial extravasations and of unusual somnolence, apathy, early cyanosis, muscular rigidity of the neck and extremities in the infratentorial cases.

Towne and Faber state that respiratory disturbance with cyanosis, generalized convulsions and rigidity of limbs indicates infratentorial bleeding, whereas unilateral convulsions or palsies, or lateral deviations of the head or eyes indicate a supratentorial lesion; the impossibility of clinically detecting intraventricular vascular trauma is mentioned.

Barnett,[17] in offering the same anatomic division of intracranial hemorrhage as Towne and Faber, divides the supratentorial hemorrhages into three stages:

(a) The Initial Stage (first 24 to 48 hours) in which are noticed restlessness associated with cries of pain, refusal to nurse and sometimes respiratory difficulty, if the respiratory center has been injured or if a contusion of the brain has occurred, when the cry will be lessened and the child more quiet and pale.

(b) The Period of Cerebral Irritation: Convulsions following the signs of refusal to nurse, pallor and cephalic cry are characteristic and diagnostic; the convulsions may vary from mere twitchings to epileptiform seizures. Yawning and sighing often accompany a hemiplegia. The skin and tendon reflexes are increased. Burr,[18] however, states that up to seven days of life, the normal reflex response is so variable as not to be of any pathologic significance. Various and multiple eye signs are present in this stage such as ptosis, strabismus, nystagmus and anisocoria (pupillary inequalities).

(c) The Terminal Stage: Paralysis occurs in the comatose child

with no response to external stimuli; the reflexes disappear and death ensues as a result of respiratory failure or aspiration pneumonia.

Large infratentorial and intraventricular hemorrhages produce signs very similar to each other. Death results almost instantaneously from asphyxia, the patient usually being in the typical opisthotonous position with cervical rigidity and spasticity of the extremities and having had one or more generalized convulsions. This period may last as long as 24 to 48 hours.

FINDINGS

In this third series of 100 consecutive deliveries, the signs present are again of the mildest character. As determined by routine lumbar punctures within 24 to 48 hours upon these newborn babies at the City Hospital, Welfare Island, through the courtesy of Drs. Dorman and Ward, hemorrhagic and yellow cerebrospinal fluids were present in 10 per cent; bloody cerebrospinal fluids were obtained in four cases and yellow spinal fluids in six instances. (The yellow fluids will be more fully discussed later in the paper.) The signs in these cases of abnormal cerebrospinal fluids were as follows: left supranuclear facial paralysis in one case, which after the complete removal of the intracranial hemorrhage by means of lumbar drainage gradually became less marked and at the time of the patient's discharge from the hospital on the tenth day the condition had entirely disappeared. Jaundice was present in one case, twitches of the hands and feet occurred in two instances, vomiting in one, poor nursing in another, and convulsions, frothing at the mouth, cyanosis and slowed respirations in one case. In six cases where the cerebrospinal fluid varied from a yellowish tinge to amber, the signs were entirely lacking. In one case, a lumbar puncture, 17½ hours after birth, revealed clear cerebrospinal fluid under a pressure of 6 mm. Hg. (normal being 4 to 8 mm. Hg.); on the sixth day, the child became markedly jaundiced, nursed poorly and a suspicious luetic rash appeared; a lumbar puncture revealed bright yellow spinal fluid, olive oil in color and consistency, which was negative for bile. The umbilical cord blood Wassermann reaction was negative. The blood-clotting time at the initial lumbar puncture was four minutes; unfortunately, later coagulation time was not taken. It required six spinal punctures at twenty-four-hour intervals to obtain clear spinal fluid.

In seven cases, some of the signs usually found in conditions of increased intracranial pressure were observed where the cerebrospinal fluid was clear and under normal pressure, as determined by the spinal mercurial manometer and where the lumbar puncture was absolutely essential as a diagnostic procedure. Three of these cases evinced twitchings of the hands and feet; two were cyanotic and two others possessed a weak cry.

Seven mothers had 4-plus blood Wassermann reactions and only

CHART I

POSITION	NO. OF CASES	WHITE	NEGRO	CHARACTER OF SPINAL FLUID					SPINAL PRESSURE					BLOOD CLOTTING TIME		
				CLEAR	BLOODY	YELLOW	MISSED	CONTAMINATED	LOW	NORMAL 4–8 M.M. HG.	INCREASED	MISSED	CONTAMINATED	NORMAL 5–8 M.	PROLONGED	BELOW 5 M. 4½–3 M.
L.O.A.	61	33	28	49	0	4	6	2	4	40	9	6	2	31	6	16
R.O.A.	18	13	5	17	0	0	1	0	4	12	1	1	0	11	1	5
R.O.P.	1	1	0	0	1	0	0	0	1	0	0	0	0	0	0	1
Not Stated	4	4	0	4	0	0	0	0	0	4	0	0	0	1	0	3
Precipitate	6	5	1	4	0	2	0	0	1	4	1	0	0	1	2	3
Medium Forceps	2	2	0	0	2	0	0	0	0	1	1	0	0	2	0	0
Low Forceps	7	5	2	6	1	0	0	0	1	5	1	0	0	7	0	0
Version and Breech Extract	1	1	0	1	0	0	0	0	0	1	0	0	0	1	0	0
Total	100	63	37	81	4	6	7	2	11	67	13	7	2	54	9	28
Prolonged Labor without Forceps	2 (L.O.A.)	0	2	2	0	0	0	0	0	2	0	0	0	1	0	1
Males	53	31	22	41	3	4	3	2	3	37	8	3	2	27	7	14
Females	47	32	15	40	1	2	4	0	8	29	6	4	0	27	2	14
Primipara	49	28	21													
Multipara	51	35	16													

two of the children were 4-plus, whereas the other five were negative to both antigens. (The blood of the children for the Wassermann test was obtained from the umbilical cord.) None of these seven babies born of syphilitic mothers had bloody or yellow cerebrospinal fluid and this merely corroborates the findings of our earlier series and what many other observers have stated, namely, that syphilis plays very little importance in the etiology of this condition.

Forceps were applied in nine cases in this series; two were medium and seven were low applications. The cerebrospinal fluid obtained at lumbar puncture was blood-tinged in one and bloody in the other of the two higher operative interferences, whereas in only one case out of seven low forceps was there blood in the cerebrospinal fluid. This

CHART II

TREATMENT OF BLOODY CASES

NOS.	NAME	COLOR	DELIVERY OR POSITION	SIGNS	PRESSURE	CLOTTING TIME	NO. OF PUNCTURES
1	L.B.	White	Med. For.	Left Supranuclear Facial Paralysis.	8 m.m. Hg.	6 m.	3
2	F.L.	White	M. Forceps	Jaundice contusion Rt. Eye.	14 m.m. Hg.	5½ m.	2
3	P.L.	White	Low Forceps	Twitches Hands and Feet	15 m.m. Hg.	6½ m.	5
4	A.D.	Negro	R.O.P.	Twitches hands and feet. Nursed poorly, vomited.	2 m.m. Hg.	4 m.	2 3*

*Missed canal on 3 occasions. Drainage insufficient.

is in accord with our former findings, namely, that properly applied low forceps is a small factor and of little importance in the production of intracranial hemorrhage compared with the higher extractions and that low forceps correctly applied at the end of twenty-four hours neither increases the risk nor the danger of intracranial hemorrhage any more than normal labor itself.

Six deliveries were classified by the obstetrician as precipitated labor; of these the cerebrospinal fluid in two cases was yellow, which under the microscope demonstrated many red blood corpuscles and in one case the cerebrospinal fluid was contaminated by a large hemorrhage due to a puncture of the spinal plexus of veins as was proved the following day by obtaining perfectly clear, colorless cerebrospinal fluid.

Patients in labor longer than twenty-four hours were considered cases of prolonged labor. There were two such cases in which no addi-

tional assistance, outside of Nature, was introduced to facilitate or hasten the delivery; the spinal fluid in both babies was clear. Version with breech extraction was performed in one case and no abnormalities were found in the cerebrospinal fluid. The umbilical cord around the neck was present in five cases; the lumbar puncture revealed clear cerebrospinal fluid in four of these children and in one the spinal canal was not successfully punctured. Cyanosis was present at birth in two infants and in both of these cases the cerebrospinal fluid was clear. One child was an eighth month premature baby, whose spinal fluid also was clear.

The anterior fontanelle, as in the earlier series, was in no way a diagnostic aid of the intracranial condition. Of the ten pathologic spinal fluids, the anterior fontanelles were as follows: slight bulging in one, tensely flush in three, flush but relaxed in one and depressed in five. Nor was the anterior fontanelle a reliable indicator of the intracranial pressure: in five cases, the anterior fontanelles were depressed and the intracranial pressure registered between 10 to 15 mm. Hg. by the spinal mercurial manometer; in three cases the anterior fontanelles were flush and the intracranial pressure ranged from 9 to 14 mm. Hg.; five cases were recorded as tense but flush anterior fontanelles and in these the pressures were from 4 to 14 mm. Hg.; five cases were classed as slightly bulging anterior fontanelles and the pressure readings varied from 2 to 6 mm. Hg.

The intracranial pressure of the cases where yellow or bloody spinal fluid was obtained varied as follows: 1 case 2 mm. Hg., 1 case 3 mm., 1 case 8 mm., 2 cases 10 mm., 2 cases 12 mm., 2 cases 14 mm., and 1 case 15 mm. Hg.; that is, seven out of ten cases registered increased intracranial manometric readings. There were five cases in this series where the spinal fluid was clear and a slightly increased intracranial pressure ranging from 9 to 12 mm. Hg. was present without evincing any of the mildest signs of cerebral edema. On the other hand, mild signs such as a weak cry, poor nursing, twitchings of hands and feet and cyanosis with normal cerebrospinal fluid under normal pressure of 4 to 8 mm. Hg. were observed in nine cases.

The blood-coagulation time was taken in each case and the normal index was considered to be between 5 to 8 minutes. In none of the four cases of bloody cerebrospinal fluid and only in one of the six cases of yellow spinal fluid was the blood-clotting time prolonged; in that particular instance, it was 10 minutes. In four cases with clear cerebrospinal fluids, the blood-coagulation time was lengthened, being 8½ to 11 minutes. This together with our former observations, tends to impress us that the hemorrhagic tendency in the newborn is only of minor importance as an etiologic factor in the production of intracranial hemorrhage in the majority of instances.

YELLOW SPINAL FLUID

Yellow spinal fluid[20] has been known to the profession for the past 26 years when it was first described by Busch in 1897 and it has gradually assumed more prominence and importance in the diagnosis of neurologic conditions. There are various opinions regarding the method of its production and none of the theories has met with universal acceptance. A thorough discussion of them is not possible in this paper and they are merely mentioned as follows: (1) the serogenic, (2) the hemolytic and (3) the conditions associated with jaundice. Various types of yellow spinal fluid are found depending upon the amount of coagulability, cell count and protein content. Again, the three chief groups of yellow spinal fluid with their respective characteristics may be stated as follows:

First, xanthrochromic or the Froin syndrome, first described by Froin in 1903.[21] This fluid is distinguished by its bright yellow color, rapid massive coagulation, its high albumen and fibrinogen content, which produces the clotting effect, and its increased cell count. This

CHART III.

TREATMENT OF YELLOW SPINAL FLUIDS

NOS.	NAME	COLOR	DELIVERY OR POSITION	SIGNS AND FINDINGS	PRESS.	CLOTTING TIME	NO. OF PUNCTURES
1	H.C.	White	L.O.A.	No. R.B.C.*	14 m.m. Hg.	7 m.	1
2	J.S.	White	Precipitate	Many R.B.C.	12 m.m. Hg.	3 m.	1
3	W.C.	White	L.O.A.	Many R.B.C.	3 m.m. Hg.	5½ m.	2
4	P.A.	White	L.O.A.	Convulsions, cyanosis, slowed respirations, No. R.B.C.	10 m.m. Hg.	10 m.	1
5	A.A.	White	Precipitate	Many R.B.C.	10 m.m. Hg.	7 m.	3
6	J.W.	Negro	L.O.A.	Many R.B.C.	12 m.m. Hg.	3½ m.	1

*R.B.C.—red blood corpuscles.

fluid is observed in conditions of vertebral, brain and spinal cord diseases where obstruction or interference to the cerebrospinal fluid circulation is produced. Most observers believe that this yellow fluid is a transudate of the blood plasma.

Second, erythrochromia, first described in 1916 by Hanes.[22] This fluid varies in color from brownish red to deep amber and the color changes from day to day, contains red blood corpuscles or their shadows, does not clot and the tests for hemoglobin are positive. The origin is believed to be a mild transudate from the blood or due to varying degrees of hemorrhage.

Third, the Nonne syndrome.[23] This fluid may be yellow or colorless, the protein content excessive and there is no cell increase.

Besides these distinct groups, many combinations may be found. In our present series, six yellow spinal fluids were obtained on

lumbar puncture and the color varied from amber to a very faint yellow tinge; four of these specimens contained red blood corpuscles microscopically and two did not. Unable to account for this character of fluid caused us to lose sight of the possible relationship between the fluid obtained and the erythrochromia of Hanes. Being chiefly interested in the questions of gross intradural hemorrhage, we failed to study all the properties of the cerebrospinal fluid obtained, but in the future the observations will be more careful and a detailed serology will be reported.

It is our belief that the yellow spinal fluids obtained within 48 hours after birth with or without red blood corpuscles are due to varying degrees of transudation of the blood plasma produced by venous congestion or partial asphyxia, or due to minute hemorrhages. Where red blood corpuscles were not found microscopically, it is not difficult to conceive that a fair amount of venous congestion can produce a limited transudation of the watery elements of the blood plasma without any of the cellular elements. In those instances where the congestion of the asphyxia is more pronounced or where minute hemorrhages due to lacerations of one or more venules occur, red blood corpuscles are added to the picture.

JAUNDICED CASES

Four children, whose initial lumbar puncture within twenty-seven hours after birth, revealed clear, colorless spinal fluid, became jaundiced on the 2nd, 3rd, 6th and 7th day, respectively. Repeated spinal punctures disclosed normal spinal fluid in three, and a thick, bright, yellow fluid of olive-oil consistency in one, the six-day-old baby; it was negative for bile, the other laboratory examinations being overlooked; six repeated lumbar punctures at twenty-four-hour intervals were necessary before normal, colorless cerebrospinal fluid was obtained. It must be mentioned that this particular baby had a suspicious rash which was interpreted by the pediatrician and obstetrician as possibly luetic and the child was treated with mercurial inunctions, even though the blood Wassermann reactions, both in the mother and child, were negative. The blood Wassermann reactions in the other three mothers and children were also negative.

It is interesting to note that the blood-coagulation time of two of the jaundiced children was four minutes and of the other two it was 10 and 11 minutes, respectively. The child with yellow spinal fluid, however, had a clotting time of four minutes. All these coagulation times were recorded at the initial puncture, namely, within the first twenty-seven hours and later clotting times upon the appearance of jaundice were not taken because of the absence of blood in the spinal fluid and therefore, the question of hemorrhagic disease of the newborn was not considered. It is, however, highly probable that the

case cited above where yellow spinal fluid was obtained on the sixth day of life was due to a late, mild intracranial hemorrhage and in spite of the absence of other signs of hemorrhagic disease of the newborn, that condition should have been seriously taken into consideration.

Two of the four jaundiced cases had increased temperature, three nursed poorly, the umbilical cords of two were very much twisted, one baby was cyanotic at birth and the intracranial pressure at lumbar puncture determined by the spinal mercurial manometer was 8 mm. Hg. in three cases and 6 mm. Hg. in the remaining one.

One jaundiced case, punctured at 71 hours of age, revealed blood-tinged spinal fluid under a pressure of 14 mm. Hg. and the clotting time was 5½ minutes. Whether the jaundice preceded the hemorrhage or not is difficult to state, though it is more plausible, in view of the above four cases, to believe that the jaundice resulted from the absorption of the hemoglobin rather than the hemorrhage was secondary to the icterus. However, at present, it is impossible to demonstrate definitely and satisfactorily any connection between true icterus neonatorum and intracranial hemorrhage, and further investigations of hemorrhagic spinal fluid and jaundice are necessary before final conclusions are drawn.

Formerly, when a newborn child evinced all the classical signs of an intracranial hemorrhage, the lumbar puncture was employed more as a diagnostic aid than as a valuable therapeutic means of drainage in the early cases and it does seem to us that spinal drainage by repeated lumbar punctures upon the newborn, within the first few days of life (before the intracranial hemorrhage has clotted) would be an additional procedure to the therapeutic armamentarium of today. It is, however, in the extremely mild cases, where only the slightest signs are present, such as an occasional muscular twitch, poor nursing, slight drowsiness, a weak cry, poor color, cyanotic tinge, or where the delivery was spontaneous or prolonged, or forceps applied and any suspicion as to a possible intracranial injury is entertained, that early lumbar puncture should be used, in the absence of shock, not for the diagnostic benefit alone, but also for the early therapeutic value of lumbar drainage, every 12 to 24 hours and even more frequently.

TREATMENT

In the four cases having bloody cerebrospinal fluid, due to intracranial hemorrhage, it required two, three, and five lumbar punctures, respectively, (at twenty-four-hour intervals) before clear spinal fluid was obtained. In one case where the pressure was only 2 mm. Hg., the spinal canal was successfully entered twice and unsuccessfully attempted three times more. The final result, as far as lumbar puncture drainage was concerned, was bad in this case because clear

cerebrospinal fluid was not obtained before the child was discharged. In the six cases having yellow spinal fluid, one lumbar puncture with the removal of 10 c.c. of spinal fluid was sufficient in four cases to clear up the condition so that in twenty-four hours, at the next lumbar puncture, the cerebrospinal fluid was clear and colorless; two drainage taps were required in another case and three were necessary in the last. In the one jaundiced case, detailed above, six repeated spinal punctures were required.

CHART IV.

SIGNS WITH CLEAR SPINAL FLUIDS

NOS.	NAME	DELIVERY OR POSITION	PRESS.	CLOTTING TIME	SIGNS	COLOR	NO. DAYS AFTER BIRTH	NO. OF PUNCTURES
1	J.M.	Precipitate Low	6 m.m. Hg.	4 m.	Twitches of hands. Press 8	White	3	3
2	P.F.	Forceps L.O.A.	6 m.m. Hg.	8 m.	Twitches of hands. P. 6	White	4	2
3	R.M.	Pituitrin	6 m.m. Hg.	5 m.	Twitches of hands.	White	2	4
4	M.L.	L.O.A.	8 m.m. Hg.	8 m.	Slight twitches hands.	Negro	1	2
5	R.G.	Precipitate	2 m.m. Hg.	9 m.	Weak cry.	Negro	Same	2
6	J.A.	L.O.A.	8 m.m. Hg.	4 m.	Jaundice P. 4	Negro	1	2
7	J.M.	L.O.A.	8 m.m. Hg.	11 m.	Nursed poorly Jaundice P. 6	White	7	2
8	C.S.	R.O.R.	8 m.m. Hg.	10 m.	Nursed poorly Jaundice	White	3	3
9	T.N.	R.O.R. Premature 8th mo.	3 m.m. Hg.	5 m.	Jaundice	White	2	2
10	G.D.	Not stated	6 m.m. Hg.	4 m.	Jaundice Nursed poorly	White	6	6

It is still our impression, that repeated lumbar punctures should be performed at least every 12 to 24 hours, in the absence of shock, depending upon the severity of the hemorrhage and of the cerebral edema as disclosed by the mercurial manometric readings. When this repeated spinal drainage fails to obtain clear fluid under normal pressure within a varying period of several days, then a modified subtemporal decompression and cranial drainage should be advocated *early* for fear of a resulting permanent cerebral impairment.

CONCLUSIONS

(1) The intracranial anatomy of the blood vessels in the newborn child is different from that of the adult and, therefore, more liable to injury than ordinarily conceived.

(2) The etiology of intracranial hemorrhage in the newborn falls into one of three groups, namely, trauma, congestion or asphyxia, and blood disease of the newborn.

(3) Syphilis, toxemic conditions of the mother, early low forceps applications and hemorrhagic disease of the newborn are relatively unimportant as etiologic factors in cerebral hemorrhage.

(4) Signs vary, depending upon the amount and location of the intracranial hemorrhage and cerebral edema. Only the mildest signs have been present in this third series and the true intracranial condition would probably have been overlooked, had the routine lumbar puncture not been performed.

(5) Ten per cent of 100 consecutive deliveries presented spinal fluids which contained evidences of intracranial trauma. In four cases the cerebrospinal fluid was bloody and in six cases it was yellow, in only four of which red blood corpuscles were demonstrable.

(6) The anterior fontanelle does not appear to be a reliable index of a mild increase of the intracranial pressure.

(7) There are three main types of yellow spinal fluid: xanthrochromia or the Froin Syndrome, erythrochromia as described by Hanes, and the Nonne Syndrome.

(8) Six cases in this series contained yellow spinal fluid.

(9) The yellow spinal fluid of newborn babies is very probably the result of transudation of the blood plasma when red blood corpuscles are absent, and due to minute hemorrhages when red blood corpuscles are present.

(10) Four cases of icterus neonatorum were present in this series and only one had yellow spinal fluid.

(11) Early lumbar puncture should be employed, in the absence of shock, not only for its diagnostic but for its therapeutic value in early cases of cerebral hemorrhage and cerebral edema. Repeated spinal drainage at least every 12 to 24 hours is indicated, depending upon the size of the intracranial extravasation or the amount of cerebral edema as registered by the spinal mercurial manometer.

(12) A modified subtemporal decompression and cranial drainage should be advocated only when the lumbar puncture drainage fails.

(13) Manometric readings of intradural pressure should be taken with the spinal mercurial manometer in all suspected cases of hemorrhage in the newborn.

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20 WEST FIFTIETH STREET.

A STUDY OF 1352 PLACENTAE WITH REGARD TO WHITE INFARCTS*

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SUCH an extensive literature has been built up on the subject of infarct formation that an explanation is due at the outset of any effort to add to the already long list of papers. In spite of the enormous amount of painstaking investigation that has been carried out by careful observers, there still seems to be no generally accepted views as to the origin of white infarcts. At the beginning of this study an attempt to learn about white infarcts from the writings of men whose opinion must bear some weight only served to confuse. It hardly seemed possible that such careful observers were wrong and yet their conclusions did not coincide. After the careful and complete macro- and microscopic study of 1352 placentae, I have come to some conclusons which make it possible to correlate some of the correct, but apparently different views. It is not my intention to attempt an exhaustive review of the literature because nothing could be gained since this has been done previously, notably by Williams.

Early in this study it became evident that no one theory could account for all the white infarcts. This term is used in the sense in which it is ordinarily applied, i.e., meaning those structures which are white in color, firm in consistency, and occur in any portion of the placenta. It will be seen that, strictly speaking in a pathologic way, it is improper when applied to certain structures, yet it would be inadvisable to attempt to change a terminology that is so familiar to everyone. White infarcts can be roughly divided into three types: (1) those replacing collections of blood; (2) those developing from red infarcts as described by Young, and (3) the senile changes which have been described by Eden and Williams.

Areas are frequently seen answering the gross description of white infarcts, but which, on microscopic examination show no villi. These seem to be identical with what Williams calls the final stage of the

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infarct, for he says, "The fibrinous infarcts, which we observe in their most fully developed form in the substance of the placenta, represent the final stage of the process. In the majority of cases, however, this is not the form of infarct which we observe, for usually we meet with less developed varieties which consist of a mass of fibrin in which are imbedded numbers of more or less well preserved villi." It would seem, however, that these fibrinous areas differ in origin from the ordinary infarct as has been pointed out in detail in a previous paper, so suffice it to say here that they are merely masses of fibrin which have been laid down in and replace a previous collection of blood. We have been able to trace this process step by step from the original hematoma to the solid mass of fibrin which is formed in the same way as a laminated clot.

In a previous paper I stated that these collections of blood were probably maternal and now I am convinced that this is a fact, and that they result from back pressure due to venous stasis as a result of changes in the maternal veins. Hitschmann and Lindenthal have pointed out that there is a slowing of the blood stream in intervillous spaces due to the fact that the blood flows into these relatively large spaces from the small maternal vessels, just as there is a slowing of the current when a stream flows into a larger body of water. This is further exaggerated by the back pressure making conditions ideal for fibrin formation just as in any thrombus.

Further studies since the original paper have confirmed these observations. Similar lesions have been observed by earlier writers except that they used the terms "fibrous" and "organization." This would mean granulation tissue such as occurs in ordinary wound repair and which never occurs in the placenta. I quote these views from Williams' article, "and Cruveilhier, in his article upon apoplexy of the placenta, stated that he had observed a complete series of cases which demonstrated the transformation of the ordinary apoplexy into pale white fibrous areas. This doctrine was enthusiastically championed by Jacquemier in 1839, and his views were accepted in their entirety by Gierse and Meckel, Klebs, Valenta, and many others and have not been completely forsaken, even at the present time. Thus we find that Shaffer considers that many of the subchorial infarcts are the result of localized hemorrhages."

We believe that all white infarcts on the fetal surface, i.e., subchorial infarcts, belong to this class. This conversion of blood to solid fibrin can occur in any location, whether it be subchorial, intraplacental, or retroplacental. Since the term "infarct" means death of tissue it is evident that it is not descriptive of these areas; however, we cannot suggest one that is, but if their etiology is kept in mind no confusion should result.

So far as other white infarcts are concerned, there are three outstanding views: First, that they are due to changes in the fetal vessels upheld principally by Eden and Williams; second, that they are due to an interference with the maternal circulation upheld principally among modern writers by Young, and third, that they are due to changes in the syncytium as pointed out by Hitschmann and Lindenthal.

It is our belief that all these views are correct in a measure. Roughly, there are two types: First, microscopic or small macroscopic infarcts involving isolated villi or small groups of villi, or the so-called decidual islands seen in every placenta; and second, the larger infarcts, always visible to the naked eye and sometimes occupying large portions of the placenta and frequently associated with toxemias.

The studies of Eden and Williams on the one hand, and they agree on all important points, and of Young on the other, have been so complete and accurate that there is very little to add.

It is self-evident that if any infarction is to take place there must be an interference with the blood supply of the infarcted areas, so the question arises—upon what blood supply do the villi depend? This, Young has answered correctly when he says maternal, and his reasons cannot be contradicted.

(1) "The time when the chorionic elements are most active and proliferate most rapidly is during the early stages of the development of the ovum, where there are, as yet, no fetal vessels formed, and where the trophoblast and its villi live directly upon the mother's blood."

(2) "In hydatid mole the chorionic villi live and, as we know, actively proliferate, when there is no trace of a fetal vessel and when the entire nourishment is derived from the blood of the mother." Hitschmann also cites this as proof and Williams states in his chapter on hydatidiform mole "as the chorionic villi are nourished by the maternal blood the mole may continue to grow after the death of the fetus."

(3) "In tubal pregnancy one can sometimes recognize the independence of the villi of the fetal blood in a diagrammatic manner. Where there has been a considerable hemorrhage into the intrachorionic space great masses of villi become strangled in blood clot. I have seen one such case where all the trunks in the neighborhood of the chorion have undergone fibrinous necrosis, but near the tube wall where, in parts, the maternal circulation was unimpaired, the tips of the necrotic villi remained healthy."

To these reasons might be added several others. In a syphilitic placenta when the fetal vessels are very few and in many cases absent, little if any more infarction is seen than in a normal placenta. The development of the discoid placenta at term from the early chorion seems to be dependent on the maternal supply. Early in pregnancy when the ovum is imbedded in the decidua and surrounded by the maternal vessels, the growth of the villi is equal about the entire periphery. However when due to an increase in size, the decidua

reflexa is lifted up and thinned out, decreasing the maternal blood supply; the adjacent villi degenerate, while those in contact with the basalis, and hence a good blood supply, continue to develop with the formation of the placenta. Hitschmann and Lindenthal point out the well-known fact that whole villi may be entirely separated from the placenta and enter the maternal veins where they are transported for varying distances and maintain their structure unchanged.

These reasons having proved, as we believe, that the villi are nourished by the maternal blood, it remains only to show that interference with the maternal supply does take place in order to demonstrate the etiology of infarction. This interference may be either arterial or venous. If arterial, an anemia of the dependent area takes place. This was recognized by Eden and given by him as the explanation for the cause of his "nonfibrinous infarcts," which are identical to those described by Young. Goodall, in describing vessel changes in a uterus forty-four hours postpartum of a patient dying of eclampsia, mentions the complete obliteration or narrowing of the caliber of the arteries and feels that these changes must have taken days for their development, or, in other words, occurred before delivery, and mentions the association of these marked changes with infarcts. Schwarz and McNalley, in a recent paper, have shown that these arterial changes are present before labor and particularly marked in toxemic cases associated with infarcts.

If the interference be venous there will result a stagnation of blood and if the back pressure is sufficient an extravasation resulting in the intra- or retro-placental hematoma will take place, the result is the depriving of the adjacent villi of their nourishment. It is known that thrombosis of decidual veins occurs before delivery as does obliteration of veins in the uterine wall, as has been shown by Goodall and confirmed by Schwarz and McNalley. Interference with the maternal supply also occurs when there is a premature separation of the placenta or a deposition of fibrin about the villi as will be pointed out later.

The idea that interference with the maternal circulation is the basis for infarction had been expressed by older writers as brought out by Williams in his monograph. Thus, "Cruveilhier designated the condition as atrophy, and believed that it resulted from the separation of the placenta from the underlying decidua, whereby the maternal vessels were lacerated and anemia of larger or smaller areas of the placenta resulted." Also to quote further from Williams, "A certain number of observers have also thought that they could find the primary cause of the disease in changes in the maternal vessels of the decidua, which resulted in thrombosis and subsequent interference with the circulation in larger or smaller portions of the

placenta. Such views were held by Rossur and Rohn, and in a modified way by Rebemont-Dessaignes."

The second type of infarct, i.e., that originating as a red infarct, is the result of either arterial or venous obstruction, as pointed out above. The changes through which the placental tissue passes to form white infarcts have been so accurately described by Young that we can do no better than quote directly from his article. We might say here that so far as infarction is concerned, we have, in the study of our large material, confirmed his work absolutely. We have many times found specimens almost identical with his illustrations and feel sure that any one who will take the trouble can demonstrate all the changes which he describes.

(1) "In the earliest stage recognizable to the naked eye the patch is deep red, purple or even black. It may not be visible until thrown into relief against the surrounding paler placenta which has lain for some days in the fixing solution, into which the unclotted blood in the intervillous spaces has oozed. The patch stands out distinctly and is sharply cut off from the surrounding healthy placenta."

(2) "In this stage the color becomes lighter. The dark red or purple becomes dusky brown, chocolate colored or brick-red. The spongy character of the normal placental tissues has disappeared and the patch cuts solid, the section showing a smooth surface all over."

(3) "In the older infarcts the color becomes progressively lighter. The dark brown of the preceding stage becomes light brown, yellow and then, sometimes, pure white."

"That such a description of infarcts is the true one is proved by the fact that one can find, often in the same placenta, all the various stages between the earliest (purple), and the latest (white) stages."

"What is the explanation of these changing colors? . . . . The first explanation that suggests itself is that it is associated with an alteration in the blood contained within the affected portion. To begin with, the villi are engorged throughout, the thin-walled capillaries in the smaller villi and the thicker vessels in the larger villi are greatly expanded and are tightly packed with blood cells. In the small villi the vessel expansion may be so extreme that the stroma has become displaced to the periphery and there intervenes between the blood in the villi and that in the intervillous spaces only a very thin sheet of tissue. The purple color of the fresh infarct is therefore due to the villi being turgid with poorly oxygenated blood. In the later stages the blood within the villi, and any blood present within the intervillous regions, becomes paler and paler, the hemoglobin becomes completely removed and nothing but the shadowy outlines of the corpuscles are seen. These stages correspond to the later stages of the infarction and demonstrate readily the meaning of the phases presented by the changing nodules."

As we pointed out in our previous paper it is only the early stages of this type of infarct to which the term "red infarct" should be applied, because it is the only condition occurring in the placenta that is both an infarct and red.

Of course, coincident with the changes in the blood described above, the deposit of fibrin about the villi and the coagulation, necrosis of the villus which has been described by other authors occurs so that in the complete infarct only the bare outlines of the villi remain,

but in any infarct in which the villi play a part their outlines can be seen. If they are not visible, i.e., if the area consists of only a mass of fibrin, the origin was a collection of blood.

In practically all macroscopic infarcts and in all that were of any size, we have been able to satisfy ourselves that they developed as described by Young. This is particularly true in those associated with the toxemias. We are not prepared to agree with Young that they are the cause of toxemia, although we do not deny that this may be possible. In these cases we have found them in all stages from red to white. Thus out of thirty-six toxemic cases, nineteen were definitely of the nephritic type, of these, fourteen were normal, two had white infarcts and three had red infarcts; eleven were probably of the preeclamptic type, of these, four had white infarcts, two had red infarcts, five were normal and one had a retroplacental hematoma; six cases were eclamptic, four of which had red infarcts, one had white infarcts and one was normal. This does not consider the collections of blood improperly called red infarcts which, as we pointed out in our previous paper, are found in normal cases just as well as in toxemic cases.

In the cases where there has been separation of the placenta and delivery was not immediate, we have found the adjacent tissue in various stages of infarction, from red to white, depending on whether delivery occurred relatively soon or late after the separation. The infarction surrounding collections of blood in the placenta sufficiently large to interfere with the circulation have always answered Young's description. This is true of the large white infarcts on the fetal surface, the major portion being made up of fibrin from a collection of blood.

We feel, however, that Young's explanation will not, by any means explain all the structures seen in the placenta which have the appearance of necrotic tissue and to which the term "white infarct" is applied. We refer to the changes that are seen in every placenta and are without pathologic significance in contradistinction to those already described which are the kind, if any, that are associated with the toxemias of pregnancy, uteroplacenta apoplexy, etc.

These nonpathologic infarcts are the ones that have been so accurately described by Eden and Williams. They are found in every placenta and Eden, with whom we agree, believes that they are the manifestation of senility of the organ. His description of these changes is so accurate that we take the liberty to quote rather extensively from his article.

"The placenta is, in short, a caducous organ. Now, all caducous organs begin to degenerate for an appreciable time before they are cast off by the individual, plant or animal, to which they belong. So the ripe placenta is a worn-out, senile structure. This failure of vitality in the placenta commences long before the ap-

proach of term, and results in certain structural alterations. The degenerations in the ripe placenta have been freely interpreted as evidence of disease. This is a serious matter, and obviously a great hindrance to the study of the pathology of the placenta. The change affects chiefly the intima (endarteritis), with some participation of the adventitia (periarteritis). The first indication of the process consists of an increase in the density and thickness of the adventitia. Almost at the same time the intima becomes affected. The subendothelial cells proliferate irregularly, either forming localized bulgings, which encroach upon the lumen, or affecting the whole circumference; or confined to one side, giving rise to the characteristic signet ring appearance of endarteritis obliterans. As a rule the endothelium is lost at this stage. In an artery thus affected the obstruction is often completed by thrombosis, or, in other cases, the lumen may disappear by thickening of the intima. Arteries showing these changes may be found in every ripe placenta; they are most numerous in the marginal cotyledons and become progressively fewer towards the center, but the number of branches affected is relatively small. The changes appear to be slowly progressive during the last three months of pregnancy."

"There are no facts, of which I am aware, bearing upon the etiology of these changes. Certainly, the fetus takes decided measures to cut itself off from its placenta during the last weeks of intrauterine life, and it seems probable that the process must be referred to the natural forces of evolution and decay."

"The first structure which appears to suffer from this progressive diminution of the blood supply to the villi is their epithelial covering. Indeed, such marked changes occur that the chorionic epithelium at term presents quite a different appearance from that of the young and growing placenta."

We might say here that, while we agree so far as the characters of these changes in the syncytium are concerned, we do not believe, in face of the evidence, that the villi are dependent upon the maternal circulation; that they can be considered as a result of the arterial changes but are rather independent of them, and probably are also an expression of senility.

To quote further from Eden:

"It will be remembered that in the young placenta the chorionic epithelium consists of two layers, a superficial layer of nucleated protoplasm, and a deep layer of well-defined cells. In the ripe placenta the deep layer has almost disappeared, being merely represented by scattered clusters of nuclei beneath the plasmoidal layer. The plasmodial layer itself is very unequal. In some villi buds and processes are still to be seen, although the development of the buds into new villi by the process of vascularization is never observed. Again, many villi show, in places, complete atrophy of the plasmodium, the nuclei having disappeared and nothing remaining but a thin structureless line. As a result of the atrophy of the plasmodium, underlying capillaries may be directly exposed to the maternal blood in the intervillous spaces. In addition to these changes the chorionic epithelium undergoes a peculiar form of degeneration. A change occurs in the protoplasm of the plasmodium and of the remains of the cellular layer, resulting in the formation of an opaque fibrillated material, staining with the ordinary reagents much more deeply than the affected parts. The change is irregular in distribution and frequently extends to the cells underlying the plasmodium. Buds are affected in the same manner, but the stroma of the villi appears never to be involved. The new material possesses many of the staining reactions characteristic of fibrin, and the process is therefore generally spoken of as 'fibrinous degeneration.' But it also

possesses many affinities with hyaline material, and its exact nature is open to doubt. It probably results from a process allied to coagulation-necrosis. Upon the degenerated areas fibrin is now deposited from the maternal blood in the intervillous spaces and often considerable heaps of this material are found. Owing to the similarity of their staining reactions it is often difficult to say where the fibrin ends and the degenerated epithelium begins."

This deposition of fibrin can be easily understood when we remember that the syncytium, lining as it does the intervillous spaces, plays the part of the endothelium lining ordinary blood vessels and in the same way permits the circulation of blood without coagulation. We know that injury to the normal lining of a vessel will result in the formation of a thrombus and in the same way injury to the syncytium will result in the same thing. This has been brought out by Hitschmann and Lindenthal. We believe that this is the cause for the formation of the type of infarcts described by Eden and Williams.

As has been stated, there is indisputable evidence that the villi are dependent upon the maternal blood for their nourishment and while we agree that the vessel changes described occur we do not believe that they are causative in the production of the infarcts, but rather that the associated degeneration of the syncytium (the endothelium of the intervillous spaces) causes the deposition of fibrin around the villus and hence cuts it off from its source of nourishment, the maternal blood, with the result that it undergoes the same change which takes place in any infarct.

There remains one other type of infarct which is seen in all placenta at term, i.e., that in association with so-called decidual islands or septa. We use the words "so-called" because there is a difference of opinion as to whether they are fetal or maternal in origin. It is our belief that they are decidua because many times they have been observed extending from the basalis almost to the chorion. The cells have definite cell boundaries, so if they were fetal they would have to be Langhan's cells, which we know disappear long before term. It is not unreasonable to believe that the villi in digesting its way into the compact layer would leave some parts undestroyed which would remain as septa or islands. However, for the purpose of explaining the associated infarction their origin is of no importance.

It is generally agreed that degeneration of these cells does take place, giving the appearance of fibrin and followed by deposition of fibrin from the maternal blood. If this increases to the extent that it surrounds the adjacent villi, their nourishment will be cut off and they will undergo infarction. This accounts for the frequent infarcts which are made up of degenerated so-called decidual islands, plus villi, all imbedded in a mess of fibrin. We believe, with Eden, that the degeneration of these islands represents a senile change seen in every placenta.

CONCLUSIONS

White infarcts may be roughly grouped into three classes. First: Areas which have the appearance of a white infarct but which are merely masses of fibrin which have replaced a previous collection of blood. They are not true infarcts in a pathologic sense, but in the absence of a better one this term is applied to them since they have the gross appearance of a white infarct as it is usually understood. All the white infarcts on the fetal surface belong to this class, as do many of the intraplacental and some of those seen on the maternal surface. These are not formed by a process of organization but merely by laying down of fibrin as in a laminated clot.

The other two classes of infarcts are dependent on the fact that villi derive their nourishment from the maternal circulation.

The second type, that described by Young, is red to begin with and becomes white by the process which he has described. These are the only abnormalities found which should be called red infarcts. To this class belong all the large infarcts and almost all of those that are visible to the naked eye. These are the ones, if any, that are associated with toxemias.

The third class are those so ably described by Williams and Eden and represent senile changes. Our only point of difference is that the senile changes of the syncytium (the endothelium of the maternal sinuses) as pointed out by Hitschmann and Lindenthal, which occur along with those in the vessels result in the deposition of fibrin about the periphery and hence cuts off the blood supply with the resulting necrosis. This is the same process as occurs when the endothelium of any vessel is injured. To this type belong the microscopic infarcts seen in every placenta and a few of the larger ones, particularly those at the periphery of the placenta.

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503 WALL BLDG.

INCONTINENCE OF URINE DUE TO RELAXED VESICAL SPHINCTER*

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INCONTINENCE of urine due to relaxed vesical sphincter is most often seen in those who have borne children, occasionally after an abdominal operation, such as hysterectomy, and rarely, in the nulliparous woman who has never had an operation.

When it occurs in the parous woman, the incontinence may be noted immediately after labor, although it is not often apparent until after the lying-in period, and the degree of incontinence is in proportion to the dystocia. The majority that I have seen have started several years after labor, and generally after the woman is past thirty-five. Occasionally this form of incontinence is found in the unmarried woman coming on about the time of the menopause or later.

It is difficult to determine whether the relaxation is due to disturbance of nerve control, muscle weakness, direct muscle injury, or loosening of the attachments of the sphincter. In the nullipara who has never had an operation, we must assume that the lack of control is due to nerve disturbance or progressive muscular weakness. Occasionally an illness associated with strenuous coughing, as influenza, bronchitis, or pneumonia, may cause or hasten a developing incontinence. The condition usually starts as a slight leakage on sneezing, coughing, lifting, etc., becoming gradually more marked; or following operation or labor there may be a complete incontinence, even when lying down.

I have arbitrarily divided the cases into four classes:

(1) Mild: Slight—occasional leakage on straining—as when coughing, sneezing, etc. The leakage in this class is more apt to occur when the bladder is full.
(2) Moderate: Moderate leakage on exertion, or straining.
(3) Marked: Total inability to retain urine in the erect posture.
(4) Complete: Complete incontinence, erect or lying.

The diagnosis is made from the history and the physical examination. Often, especially in the clinic class of patients, it is difficult to determine whether their statement regarding inability to hold urine refers to marked frequency and urgency, or incontinence, and can only be found out by very careful questioning. If the clothes are never wet, the inference is marked frequency and not incontinence.

In examining the patient, we have her strain when the bladder is full, and observe whether or not there is leakage. If none is apparent in the lying posture, the patient is examined standing. The

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urethral orifice itself should be observed, for at times there is incontinence on straining with vesicovaginal fistula, or a fluid collected in the vagina from a ureterovaginal fistula is expelled.

The instrumental examination consists in excluding vesicovaginal and uterovaginal fistulae, supernumerary ureters, and an examination of the sphincter itself. In most of these patients very little resistance is felt to the passage of instruments through the urethra. To determine the tonicity of the sphincter, we observe how promptly and how tightly it closes over the end of a tubular cystoscope of the Kelly, Farrar, or Geringer type. In normal patients there is an immediate contraction of the sphincter as the instrument is withdrawn, but with relaxed sphincter, the closure is sluggish and it often remains open after the distal end of the instrument has been withdrawn into the urethra. This is particularly noticeable when using the water-filled type of urethroscope.

Treatment.—For some of the milder degrees of incontinence, especially when associated with urethritis and trigonitis, applications of silver nitrate are beneficial, though frequently disappointing. An Albert Smith or a Hodge pessary, or a lamb's wool tampon, will often give the little support necessary to prevent leakage, and may act as an efficient palliative. Galvanism, or faradism, of the urethra, with the one electrode in the urethra, and the large, indifferent one over the sacrum, has at times been beneficial, according to Somerville (British Medical Journal, August 25, 1923).

All kinds of operations have been advocated. Twisting of the urethra through 180 degrees after dissecting it free (Gersuny); advancement of the urethra, so that it is stretched and angulated under the symphysis pubis (Dudley); injection of paraffin around the sphincter; dissection of the pyramidalis muscles, passing them down under the symphysis and around the urethra (Stoeckel); the same procedure using the inner edges of the levator ani; have all been tried with more or less success. Hugh Young has reported success in shortening the posterior portion of the sphincter, after suprapubic cystotomy. It has the double disadvantage of requiring an incision through the vesical mucosa over the sphincter, and an opening into the bladder.

Regarding the aforementioned operations, I assisted in the performance of a Dudley after the failure of a Gersuny, and it was a likewise failure. I saw Dr. Robert T. Morris do a Gersuny that was entirely satisfactory for ten years; there has been a slight incontinence during the past six months.

My operative work on these cases began at the time Dr. Kelly first described his operation, and I have followed his technic very closely, except that I use number two, ten-day, chromic catgut for the deep sutures, instead of linen.

Briefly stated, the operation consists in exposing the anterior vaginal

wall by posterior wall retraction, with the patient in the lithotomy position, incision in the midline from just back of the urethra, almost to the cervix. The vaginal wall is then dissected from the bladder sufficiently to show up the sphincter, which is a poorly defined structure. To determine its situation, a Pezzer catheter is inserted in the bladder. By gentle traction on the catheter, with one finger against the anterior vaginal wall, the sphincter is located as the structure just anterior to the mushroom part of the catheter where it meets resistance on withdrawal. It is essential to determine accurately the location of the sphincter to insure a good result, and to prevent ureteral injuries. Two tiers of two mattress stitches each are so placed that the sphincter is enfolded against the floor of the urethra and narrowed from side to side. No undue tension should be used, or sloughing may result. The redundant anterior vaginal wall is resected, and the wound closed with interrupted chromic catgut stitches.

I have at times combined this operation with a Watkins interposition operation in marked cystocele. We have all seen patients relieved of incontinence by the interposition operation, and one might feel that it would be sufficient, but I do not think it safe to rely on this alone.

In patients with senile atrophy of the vagina, and in elderly nulliparae, it is advisable and at times absolutely necessary to make a deep pararectal incision through the perineum to get adequate working room. Often the senile changes make the separation of the vaginal mucosa from the bladder difficult, and great care is necessary not to tear the vaginal flaps.

About two months ago I operated from above on a relaxed sphincter, obtaining an entirely satisfactory result, and very recently have done a second case. The operation is easily performed and has some good points over the Kelly procedure. In addition to narrowing the sphincter, the urethra should be brought forward in the instances where there has been a descent due to labor. This is readily accomplished by leaving long both ends of one of the more superficial sutures in the sphincter and anchoring them to the fascia of the abdominal incision.

I believe the suprapubic operation indicated where, in addition to the repair of a relaxed sphincter, abdominal work needs to be done through a low median incision; in elderly nulliparae; where previous vaginal operations make sphincter exposure difficult; where the Kelly operation has not been successful; and where there is marked senile atrophy of the vaginal mucosa.

My operative experience consists of twenty-one cases, in eighteen of which the Kelly technic was used, and three the suprapubic technic, divided into the four groups previously mentioned. The results were as follows:

(1) There were none of the mild cases.

(2) Of the moderate class eight, six successful, and two not heard from.

(3) Of the nine in the marked class, there is no report on two, one was a failure, one a partial success, and five very satisfactory.

(4) Of four with complete incontinence, one was a failure, one moderately benefited, and the other two were gratifying successes. One of the latter had, in addition to the sphincter lesion, a urethrovaginal fistula, due to a very difficult forceps delivery. The slightly benefited one had had four previous operations.

An analysis of the results of this operation gives a gratifying degree of success.

54 East Forty-Eighth Street.

INTERNAL MIGRATION OF THE OVUM IN THE GUINEA PIG

By Paul B. Kinney, M.D., Stanford University, Cal.

(From the Department of Anatomy, Stanford University.)

THE purpose of this investigation was to determine whether internal migration of ova occurs in the guinea pig and, if so, to learn in what ratio this phenomenon takes place. It was decided that the most certain method of arriving at a definite conclusion would be to remove one ovary. By mating these operated pigs and examining the pregnant uteri, a definite conclusion could be reached regarding the problem. The presence in a single guinea pig of an implantation in the horn from which the ovary had been removed would be conclusive evidence that internal migration had occurred. Negative results could be conclusive only if a large series of experiments was made.

Corner (1921), working with the domestic pig, investigated the problem of internal migration of the ova, by noting the position of implantations in the uterus; and by correlating the number of implantations in one horn with the number of corpora lutea found in the corresponding ovary. This method is unreliable, however, because of the possible rapid retrogression of a corpus luteum, the possible failure of a corpus luteum to form, because of the occurrence of polyovular follicles, or of single ovum twins.

It was found that the simplest method of reaching the ovary is to make a dorsal incision 1 cm. long just at the lower pole of the kidney. The reflection of the peritoneum makes it difficult to remove the ovary without cutting into the peritoneal sac but as soon as the peritoneum was incised, the ovary protruded through the opening. It could then be easily picked up and the oviduct and vessels ligated as near as possible to the ovary. The peritoneum and muscle layer

were then sewn together. A single stitch was usually sufficient to close these layers. The skin was closed with two stitches, the operation lasting less than fifteen minutes.

When the pigs had fully recovered from the operation they were mated; and when pregnancy had lasted twenty to twenty-five days, they were killed, and the uterus examined. At the present time, I have killed nineteen pregnant guinea pigs. As nearly as could be judged from gross examination, the tube from which the ovary had been removed was normal in each case. The size and color compared very favorably with that of a normal uterus. The adhesions were slight in all of the cases, being present only at the extreme distal end and in no case was there any apparent constriction of the oviduct.

In none of these pigs could I find any evidence of migration of the ova. The implantations were all in the horn having the ovary intact.

TABLE I

NO. OF PIG	OVARY REMOVED	IMPLANTATIONS RIGHT TUBE	IMPLANTATIONS LEFT TUBE	TOTAL IMPLANTATIONS
73	right	0	3	3
76	"	0	1	1
322	"	0	2	2
60	left	3	0	3
344	right	0	3	3
81	"	0	3	3
66	"	0	1	1
82*	"	0	4	4
77	"	0	3	3
1	right	0	1	1
2	"	0	3	3
3	"	0	3	3
4	"	0	3	3
5	"	0	3	3
6	"	0	3	3
7	"	0	3	3
8	"	0	2	2
9	"	0	3	3
10	"	0	3	3

*At autopsy of Pig No. 82, it was found that the right horn was atrophic. It appeared very small in diameter and pale in color but patent and hence was included.

The implantations appeared normal but the number of conceptusses does not seem to have been materially reduced by the removal of an ovary, for the average litter in our stock according to Draper (1920) and Tresidder (1922) is three, while the average litter from operated pigs is 2.7. This result is in entire agreement with the findings of Doncaster and Marshall (1910), King (1911), and Arai (1921), on rats, and of Hartman (1923) in the opossum. Since the response of the remaining ovary is so prompt it also suggests that it would be due to rapid maturation of more ova and that only a pseudo- and not a true hypertrophy occurs under these conditions. The increase in size of the remaining ovary no doubt is due largely if not wholly

to an increase in the number of rapidly maturing Graafian follicles and to the subsequent increase in the number of corpora lutea as concluded by Arai.

While the series reported here is very small, the results are unequivocal and suggest that if internal migration of ova does take place in the guinea pig, it does not take place in any such ratio as one to three as Corner (1921) concluded was the case in the domestic pig. The table shows that in thirteen of the nineteen cases reported, there were at least three implantations in one horn and none in the other. If a power of distribution of ova were possessed by the guinea pig, it should have manifested itself in instances in which this number of implantations was found in one tube. This should particularly be the case since one conceptus out of three implanted in one horn, not infrequently dies and is absorbed.

Corner cited one case in the domestic pig, No. 112, in which there were five corpora lutea in the left ovary and two in the right. The left tube of the uterus showed three implantations and the right tube four, suggesting that two of the fetuses in the right tube must have come from the left ovary. Because of the rapid retrogression of corpora lutea when pregnancy does not follow, Corner believed that there is no danger of confusing corpora of different ovulations, and never observed failure of corpora lutea to develop. He found polyovular ova but they were rare, and, in his opinion, could not account for the appearance of migration in one out of every three pregnancies.

Andrews (1912-13) reported a case of interstitial pregnancy on the right side, that could be removed without opening the uterine cavity, with a normally implanted twin embryo in the right cornu of the uterine cavity, in a woman whose right tube and ovary had been removed. This would seem to be an authentic case of internal migration of the ovum in the human uterus, and a careful survey of clinical records might disclose similar cases of internal migration in women. However, Williams, in discussing the case of Coe (1893), believed it to be one of external rather than of internal migration, thus throwing doubt upon Coe's case. Moreover, in view of the totally different anatomic conditions in man the occurrence of internal migration in women would offer no proof of its occurrence in bicornuate uteri.

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THE CONTRAINDICATIONS TO RADIUM IN THE TREATMENT OF DISEASES OF THE FEMALE PELVIS*

By F. E. Keene, M.D., Philadelphia, Pa.

(Department of Gynecology, University of Pennsylvania.)

THREE requisites are essential to successful radiotherapy in diseases of the female pelvis, viz., the skilled diagnostician, the competent gynecologic pathologist, and the sane radiologist. In the treatment of any large series of cases, the absence of either of these will result in failures or even disasters which could otherwise have been avoided. The day is past when radium is available only in large institutions, where these requisites are met and, as a consequence, it is often used unwisely, without the proper appreciation of its indications, contraindications and dangers. Therefore, when your President requested me to present a paper dealing with the dangers or contraindications to radium, I accepted with pleasure, hoping the discussion of my remarks by this body of experienced men might be far-reaching in its effects by way of emphasizing the limitations to this form of treatment.

Because of my association with Doctor J. G. Clark in the Gynecological Clinic of the University of Pennsylvania, it has been my good fortune to be able to follow a large series of cases since the use of radium was started about twelve years ago. From these observations, two facts stand out preeminently: one, that in properly selected cases, the advent of radium marks a great epoch of advance in the realm of gynecologic therapeusis and has proved a boon and indeed a life-saving measure in many instances; the other and no less important fact is that a sharp dividing line exists in the types of cases suitable for irradiation or operation, the proper selection of the one or the other depending upon an intelligent conception of the pathology at hand as well as an adequate appreciation of the relative merits and disadvantages of each in the treatment of any given lesion. Such a decision can be made only by the gynecologist who is experienced in both forms of treatment; the indiscriminate use of radium or the x-ray by those inexperienced in gynecology and the rental of radium or its emanations without most careful supervision of the lesions to be treated must inevitably be followed by dire consequences. Examples of these misdirected efforts have repeatedly come under our observation and, as a consequence, not only much discredit has fallen upon radium but, what is more important, actual harm has been done to the patients.

*Read at a meeting of the New York Obstetrical Society, February 12, 1924.

With these preliminary general remarks let us pass to the contraindications to irradiation as we see them. Being among the first in this country to use radium extensively we have felt our way cautiously, making a careful survey of our cases at frequent intervals; the contraindications as I shall present them are based entirely upon the knowledge gained from such observations and a strict adherence to these restrictions has given us results which have been eminently satisfactory.

My remarks have to deal largely with the treatment of benign lesions. Discussion of the relative value of irradiation, operation or a combination of the two in cancer of the cervix is not in the province of this paper. Suffice it to say that in the very early lesions, we believe that operation supplemented by irradiation is the method of choice. During our earlier work, every case of carcinoma of the cervix was treated with radium, irrespective of the extent or duration of the disease. We now believe such a course is unwise in that with certain types of lesions, even palliation cannot be hoped for; on the contrary, irradiation may add suffering to the patient's already miserable existence. Into this category fall particularly those cases showing extension to the bladder base and rectum or wide parametrial or uterosacral involvement. The occasional brilliant result obtained in even the very advanced cases might argue against their rejection but such an argument falls in a review of a large series. What a combination of radium and the modern deep x-ray therapy offers in such cases is still open to question. While only the early lesions of cervical cancer are operated upon, the remainder being treated by radium and x-rays alone, it has been our plan to employ operation in even the fairly advanced fundal carcinomata, applying radium ten days or two weeks later.

In discussing the contraindications to radium in the benign lesions, I shall limit my remarks to cases of myomata and so-called myopathic hemorrhage. Our belief that radium is not indicated in the treatment of many such cases is demonstrated by a recent review of our work which shows that about 50 per cent were subjected to operation. The selection of the one or the other form of treatment has been based upon what we consider important contraindications which can be stated as follows:

1. *Tumors larger than a three months' pregnancy.* Such tumors often present more or less extensive benign degenerative changes which are not favorably influenced by radium and are not uncommonly associated with adnexal or intestinal pathology, difficult or impossible to detect prior to operation and requiring surgery for its cure. Further, the vascular supply of these larger tumors is very limited and the effects of irradiation may so impair their nourishment as to bring about rapid degenerative changes.

2. *Rapidly growing tumors* suggesting sarcoma or actively progressing benign changes within the tumor, such as hemorrhage, necrosis or liquefaction.

3. *Uncomplicated tumors of any size giving rise to symptoms other than abnormal menstruation.* The symptoms requiring treatment are, to a great extent, mechanical in origin, the result of traction or pressure, hence their relief is dependent upon removal of the tumor. While disappearance of the tumor is a common occurrence following irradiation, the process is a slow one and excision is the better procedure. Again, such tumors are as a rule situated at some distance from the uterine cavity so that the full effect of the radium is not exerted upon them.

4. *Tumors associated with pelvic pain.* Pain in association with a myoma is not uncommonly due to adnexal disease, especially a chronic inflammation, to degenerations within the tumor or to an adenomyoma. Experience has taught us that radium may excite an acute exacerbation of an old inflammatory lesion and is to be avoided under such circumstances. A tumor which has undergone such extensive changes within its substance as to cause pain is not favorably affected by radium and should be removed by operation. We are of the opinion that adenomyomata do not react well to radium, although this statement is decidedly open to question. While it is often impossible to determine prior to operation the exact lesion responsible for the pain, we do know that whatever the pathology producing it may be, its treatment by operation is preferable to irradiation.

5. *Pedunculated tumors, whether subperitoneal or intrauterine.* Radium is useless in the treatment of pedunculated subperitoneal tumors; it often has no effect on the bleeding of pedunculated intrauterine tumors and its action may readily be followed by extensive necrosis of the tumor.

6. *Tumors producing hemorrhage and complicated by demonstrable adnexal pathology.* From what has ben said in a preceding paragraph, further elaboration on this contraindication is unnecessary.

7. *The presence of a marked secondary anemia in association with tumors not giving rise to sufficient uterine bleeding to account for the anemia.* Three such cases have come under our observation. In each careful studies failed to demonstrate the cause of the anemia and at operation widespread necrosis of the tumors was found. Rapid disappearance of the anemia following operation warrants the conclusion that the necrosis was responsible for it.

8. *Tumors in young women.* Radium in sufficient dosage to cause disappearance of the tumor will very likely produce a premature menopause and sterility. Minimal doses are justifiable and often beneficial in the treatment of the so-called ovarian or myopathic

hemorrhages in young women but not, in our opinion, when a myoma is demonstrable unless some grave contraindication to operation is present.

9. *Tumors so distorting the uterine cavity that introduction of radium well above the internal os is impossible.* Under such circumstances, not only will the uterus be insufficiently irradiated, but subsequent contraction of the internal os incident to the fibrosis produced by the radium can readily occur, giving rise to hematometra or pyometra. Further, this condition precludes a thorough diagnostic curettage so that an area of malignancy may easily escape detection.

10. *In cases where differentiation between a myoma and an adnexal tumor cannot be definitely determined.* Even under the relaxation of ether anesthesia, this difficulty may arise and is an indication for operation rather than irradiation.

11. *Myomata or myopathic hemorrhage in nervous women.* A review of our cases shows that when full doses of radium have been used, and by this we mean 1200 milligram hours, menopausal symptoms develop in about 65 per cent. Of these, 35 per cent exhibit very marked symptoms. Even the normal menopause presents such wide variations in its symptomatology that an accurate comparison with the postradium menopause is impossible, nor can we prophesy what the effects of radium will be so far as the menopausal manifestations are concerned. It is our belief that the menopausal symptoms when they do develop after irradiation are more acute than the normal and that such exaggerated symptoms are more likely to follow in the highly nervous individual. Experience has taught us that operation is the wiser plan in the treatment of these patients, with conservation of one or both ovaries, a myomectomy if possible, or a supravaginal hysterectomy, attempting to leave sufficient endometrium so that a scanty menstruation may occur.

12. *In cases of radiophobia.* Because of the publicity given to radium and its effects by the lay press and the ill-advised or prejudiced statements made by members of the medical profession, a fear of its application may be so strongly embedded in the minds of some patients as to warrant its rejection in favor of operation.

This concludes the contraindications which govern us in our use of radium. If such restrictions are followed,—and in our Clinic only rare exceptions are made to them,—it is evident that a large proportion of benign lesions are at once relegated to the surgical domain. Contrary to the belief of some and the criticism of others, we hold that radium should not be looked upon as a competitor of surgery; each has its place in the treatment of benign uterine hemorrhage, the indications of each are sharply defined and the use of the one to the exclusion of the other is not to the best interest of the patient.

MEDICAL ARTS BUILDING.

(*For discussion see page* 219.)

OUR PRESENT ATTITUDE TOWARDS FIBROID TUMORS

By William Neil, Jr., M.D., Baltimore, Md.

(Associate Surgeon, Howard Kelly Hospital.)

DAILY experiences reveal a remarkable lack of uniformity in the medical profession at large in its relation to the treatment of fibroid tumors of the uterus; whether or not to let a given case alone, or if active intervention is deemed wise, just what that intervention shall be. In a matter so important, where our totality of experience has been so large for the past forty years, I feel that we ought by this time to have reached a consensus of opinion, which still seems remote. After a considerable personal experience, having reached definite conclusions, I feel it worth while to state my own convictions and to invite criticism in the hope of helping to arrive at some measure of standardization.

I well recall my first uterine fibroid operation while I was the surgical resident at the Church Home and Infirmary in Baltimore in 1914. The patient, a married woman, aged forty-two, had borne three normal children and came on account of prolonged menstruation, more or less persistent for a year. I found a soft, globular fibroid, loosely filling the pelvic cavity, with no lateral inflammatory complications, for which I did a supravaginal hysterectomy; the patient recovered and is well today. My later experience has shown me this would have been an ideal case for radium therapy, where the operation, attendant risks and subsequent convalescence would have been avoided. During my residency I saw many similar cases, both of my own and with the visiting staff, many of which I criticize today from a newer and better viewpoint, so extensively has radium altered our therapeutics.

We have today manifestly before us the choice of one of the following plans of treatment: (1) operate and remove; (2) radiate; (3) "let alone and observe." 1.—I believe that operation is the wiser choice in the following types: (a) very large tumors, up to or above the umbilicus; (b) tumors associated with much pain; (c) tumors accompanied by pelvic inflammatory disease or any well-defined lateral complication; (d) multinodular tumors filling the lower abdomen; (e) all tumors complicated by malignancy of the cervix or uterine body; (f) tumors interfering with urinary function, especially those lodged in the pelvis and pressing on the bladder; (g) where there is a reasonable doubt as to the nature of the growth or some additional possible serious complication. 2.—Radiation is indicated: (a) in all tumors with hemorrhages, from small myomatous nodules up to freely

movable tumors reaching as high as the umbilicus, and occasionally much larger; (b) any of the operative class where operation is dangerous on account of some serious constitutional condition. 3.—The "let alone and observe plan," as yet rarely recommended by doctors at large is, I believe, best in most cases, taking all fibroids as they come to the hands of the general practitioner. This judgment needs modification in an active surgical clinic to which patients are apt to be referred because of something unusual in their condition—in other words patients who have been carefully studied by their home doctor over a considerable period. Where there is no obvious disturbance to health present or threatened, it is safer to advise the "let alone" plan; the mere fact of the discovery of a tumor is not a sufficient indication for operation, as many believe. This fear of a tumor or "onkophobia" was generated a couple of decades ago by articles piling up statistics and setting forth the numerous complications frequently found with fibroids and their degenerations. While we do not question the statistics, we do consider the deductions and consequent practice based upon them largely erroneous.

I would insist, in correction of this error, that these possible complicating conditions, which have so often been used to induce the patient to submit to operation, can almost invariably be discovered with a careful examination. This then enables the surgeon to operate not for fear of meeting some one or more out of the long list of complications, but because of the known presence of a particular and clearly determined complication, while at the same time he has refused to operate in other cases in which he has found no complication. For example, ovarian cysts and dermoid tumors can be felt, cancer of the mucosa or cervix and sarcoma can be found by curettage. Again, the complaint of an undue amount of persistent pain justly excites suspicion and determines operation. Many of the complications are really too trivial to mention.

My conclusion, therefore, is that it is possible to found the operation on a definite diagnosis as to the growth itself or its determined complications and not upon a mere statistical phobia.

Taking as a sample a group of 62 cases gathered from a rapid survey of a large number of histories, these divide themselves from the viewpoint under discussion into two groups: (a) those referred by doctors with a view to operation, 28 in number; (b) those discovered for the first time by us while examining for some other complaint, 34 in number. In each case the fibroid gave rise to no symptoms, and in none was an operation advised. The patients were sent home with instuctions to be examined about every six to twelve months; if there was any tendency on the part of the tumor to give rise to troublesome symptoms at a later date, operation or radiation

would then be recommended. Of the group of 62 the average age was forty-one years; 40 were married and 22 single. The tumors varied in size from a small nodule or nodules within the uterine body, a multinodular or small globular tumor which loosely filled the pelvis, to those easily felt above the symphysis or reaching half-way to the umbilicus. The upper limit is arbitrary and may be extended or diminished; extended in the case of the larger, movable growths where the patient is comfortable, diminished as in retroflexed uteri with the tumor filling the pelvis and approaching the point of exciting pressure. If a patient lives where she cannot be followed up and examined, it is then often a better plan to adopt one or other method of treatment. We would also modify this dictum and operate or radiate when she has an incurable "onkophobia" and spends her days brooding over the tumor and its possible consequences.

In a considerable number, where we find a globular uterus and evidence of a single tumor in a young married woman desirous of children, we urge myomectomy with the permission to act more radically in case of necessity or error in exactness of diagnosis. A number of pregnancies have occurred in this group.

I would summarize this brief communication as follows:

1. There is too much operating done on fibroid tumors on insufficient indications.

2. The average fibroid does not need operation, but occasional observation; this applies to those up to about the size of a five months' pregnancy.

3. The possible "complications" have too often been used as a bugbear to stampede patients into operation on the ground of what might take place if the tumor is let alone, or again on the supposition of presumptive complications to be discovered at operation.

4. This whole standpoint is not rational, as the serious complications can be discovered by careful physical examination.

5. Cases where there is any grave doubt as to diagnosis or complications should be included in the operative class.

6. Many cases where "fibroids with complications" have been found and an operation done have been incorrectly billeted. The proper label would be a small fibroid incidental to the other trouble.

7. Fibroids with serious complications, demonstrated or suspected, call for radical operative treatment. Where the fibroid is uncomplicated, if treatment is called for, then radium must be given the first consideration and operation the second.

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PURPURA HEMORRHAGICA (POSTPARTUM) TREATED WITH RADIUM AND ROENTGEN RAY WITH REPORT OF A CASE*

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PURPURA hemorrhagica is not a very common condition. At the Massachusetts General Hospital 65 cases of idiopathic purpura occurred among 155,884 medical and surgical patients during 33 years; at John Hopkins, 41 cases in 18,594 medical patients; at the Hamburg General Hospital, 73 cases in 41 years in a total of 100,000 patients.

The senior writer in the course of his clinical work had opportunity to see various types of purpura hemorrhagica and in his experience, cases that follow pregnancy are the most severe type.

The use of atropine was regularly followed by marked signs of improvement, and in the case reported here, it acted in the usual way in the primary attack, but failed in the relapse.

The present case is reported because purpura hemorrhagica following pregnancy generally ends fatally, while this case recovered and furthermore because radiotherapy in some manner evidently contributed to the favorable outcome.

Mrs. S. W., age twenty-eight, housewife, born in Russia, was admitted to the Lebanon Hospital March 31, 1922, with the following history: About eight weeks prior to admission was delivered of a full term baby, normally. During her postpartum period had the usual moderate bloody discharge from the vagina for the first week, which then increased until her discharge from the sanitarium three days later and continued on the increase after she arrived home. During the latter part of her pregnancy had occasional bleeding from the nose and gums, slight in amount. About ten days postpartum bleeding from her gums reappeared. Five weeks later her condition became so alarming that a transfusion was done.

There was no family history of hemophilia or hemorrhagic diathesis. Past history, personal and menstrual, was negative.

On admission to the hospital was suffering from profuse vaginal bleeding, bleeding from the gums and general weakness and debility and was admitted to the gynecologic service of Dr. Rongy.

Physical examination showed marked pallor, scabs about the lips indicating recent bleeding, petechial hemorrhages on roof of mouth, bleeding from gums, and vaginal bleeding. The skin all over her body was covered with petechia which were most marked where pressure was evident.

*Read at a meeting of the Bronx County Medical Society, October 17, 1923.

On admission the temperature was 101.6° F. pulse 110, respiration 28. Red blood cells, 2,890,000, hemoglobin 60 per cent, white cells 8,200, polys 75, lymphocytes 26, blood platelets 122,620. Coagulation time 11 minutes (which according to the method used was within normal limits). Bleeding time nine minutes. Vaginal examination, except for the bleeding, was negative.

Transfusion was given with no effect on the hemorrhages. After the transfusion blood examination showed red cells 3,500,000, hemoglobin 65 per cent, white cells 8600, blood platelets 160,000, coagulation time nine and one-half minutes, bleeding time six minutes. Urine was bloody, albumen 3-plus. Stool was negative. Blood pressure 95/45. Blood chemistry normal. Wassermann negative and ophthalmologic examination negative.

The patient was transferred to the Medical Service, still bleeding, complaining of blurred vision, generalized pains most marked over both tibiae with tenderness due to subperiosteal hemorrhages, and pains in right side of chest close to sternum. These latter were caused by a hemorrhagic pleurisy evidenced by leathery friction rubs over this area, which disappeared and reappeared with every appearance and subsidence of pain. After a period of nine weeks in the hospital, under atropine therapy, hemorrhages finally subsided, patient's condition improved, and she was taken home. On discharge, blood examination showed 3,200,000 red cells, hemoglobin 70 per cent, white cells 7000, platelets 175,000. One week later commenced to bleed anew from the vagina and was re-admitted to the hospital May 27, with a temperature of 100.8° F., pulse 112, respiration 28. Blood examination showed 4,000,000 red cells, hemoglobin 79 per cent, 10,200 white cells. Bleeding time nine minutes. Coagulation time 11 minutes. Blood platelets 160,000. On June 4 transfusion was done with no effect on the hemorrhage but a fairly marked serum reaction. Examination of the blood on June 5 showed 3,200,000 red cells, 42 per cent of hemoglobin and 7800 white cells. Platelets 155,000. Blood pressure 95/75. All symptoms of the primary attack were reasserting themselves, including the hemorrhagic pleurisy, this time associated with choking sensations and accompanied by cough and bloody expectoration.

The condition of the patient grew worse, anemia becoming more profound and despite the various therapeutic measures used, including atropin, calcium, coagulen, thromboplastin, placental extract, horse-serum, transfusions and packing the vagina, the hemorrhages persisted. It was therefore decided to apply radiotherapy, with two purposes in view: (1) to produce an artificial menopause, and (2) to attempt to influence the abnormal structure of the blood.

On June 8, the patient received her first radium treatment. Her condition was so critical and her anemia (Hgb. 35 per cent) of such marked degree that another transfusion of 500 c.c. was given without any influence on the metrorrhagia or the bleeding in general.

During the following four weeks, bleeding was more or less continuous, though not profuse, mostly from the vagina, but also at times from the gums and nose. Petechial spots appeared in the skin over the eye-lids, chest, and of the extremities. On June 27 blood examination showed hemoglobin of 18 per cent, no platelets observed at all, and no retraction of clot.

Though the hemorrhages seemed to show gradually a diminution in amount, it was not until July 24 (about six weeks after use of radium was started) that we noticed cessation of hemorrhages and a marked improvement in the general condition of the patient.

It is important to state here that as a general rule, the full effect of a course of radium therapy in any condition does not manifest itself until six to eight weeks have elapsed.

Examination of the blood on Aug. 12 showed 5,000,000 red cells, 85 hemoglobin.

Coagulation time five minutes. Bleeding time one and one-half minutes. On Oct. 4 patient was discharged from the hospital in excellent condition, no hemorrhages present.

No bleeding occurred until May 3, 1923, when moderate vaginal bleeding commenced, lasting ten days, for which another course of deep roentgen therapy to the pelvic region was given. Blood examination showed red cells 3,700,000, hemoglobin 86 per cent, white cells 7400, platelets 220,000. Bleeding time three minutes. Coagulation time 10 minutes.

During the first six weeks of radium therapy patient received about 20,000 mc. hours applied over symphysis, vulva, spleen, and per rectum in divided doses.

After the patient left the hospital, radium therapy was continued over the spleen but in smaller dosage, giving about 100 mc. hours twice a month and deep roentgen therapy to the pelvic region at intervals.

Examination of the patient's blood on April 16, 1924, showed the following: red blood cells, 4,224,000; hemoglobin, 75 per cent; white blood cells 5800; P., 60 per cent; S. L., 26 per cent; L. L., 7 per cent; E., 4 per cent; Mon., 3 per cent. Bleeding time, 6 minutes; coagulation time, 8 minutes; platelets, 96,000 per c.c. min.

The literature presents few cases of the postpartum type, and all proved fatal within a few months.

John Diehl,[1] reported a case in a woman, aged thirty-eight, para vi, no miscarriages, who aborted in the fifth month, with extensive hemorrhages throughout which proved fatal soon thereafter.

Ottenberg and Libman,[2] in a study on blood transfusion reported two cases of postpartum type of purpura hemorrhagica which were fatal.

Among the observations of the effects of radiotherapy on the blood, Kazenelson and Lorant[3] have shown that the bleeding time is shortened after irradiation.

In reference to splenectomy in general blood conditions, Levin[4] maintains that in any type of disease where the spleen is considered a possible cause of exerting a destructive influence, radiotherapy should be tried in lieu of a splenectomy.

CONCLUSION

In this case the most threatening phenomenon was the metrorrhagia, and it is well known that the essential or climacteric type is promptly influenced by radiation. Regardless of etiology, it was worth while to try its action on this metrorrhagia and general purpura, and it is very significant that even when the metrorrhagia was caused by a general condition, such as was apparent in this case, the result was satisfactory. It seems evident that the radium therapy was followed by a clinical arrest of the disease which is lasting now 18 months, while no other method of therapy was able to produce this effect.

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125 WEST 72ND ST.

A MIXED CELL TUMOR OF THE UTERUS*

By Solomon Wiener, M.D., New York

MIXED cell tumors of the uterus are by far the rarest form of neoplasm encountered in this organ, Of the very limited number of such cases, the majority reported have been such as spring from the cervix. Much less frequently they arise in the body of the uterus. Most of these tumors of the corpus uteri are mesodermal mixed cell tumors. The case I wish to report is one of fibrochondromyxosarcoma, of teratoid type, arising in the endometrium of the fundus uteri. Up to 1908 there were only eleven of these cases of teratoid type reported in the literature. These are collected in the second edition of Veit's *Handbuch der Gynaekologie,* where there is a fairly full exposition of the subject.

Since that date I have been able to find six further reports of such teratoid tumors, of which only two have been in the American literature.

Jessup reported the first American case in 1913. According to him, the growth consisted of (1) areas of large spindle cells, the general picture of an actively growing spindle-celled sarcoma; (2) large irregular alveoli lined by cuboidal epithelium and surrounded by connective tissue stroma; (3) masses or nests of round or oval cells with the appearance of carcinoma; (4) scattered islands of hyaline cartilage.

The second American case, reported by Perlstein in 1919, is very similar to mine. He called the tumor a botrioid chondrosarcoma of the endometrium of the corpus uteri. There were two kinds of tissue predominating, cartilage, and a loose connective tissue. In the latter the nuclei are far apart and the tissue is myxomatous in appearance. There are also sarcomatous areas, and isolated glands of the endometrial type.

In Nicholson's case at Guy's Hospital, London, the tumor was composed of connective tissue, cartilage, epithelium, and sarcoma.

Murray and Littler report a case in which the tumor was made up of connective tissue, sarcoma-like structures, gland tubules, and small nodules of cartilage. They state that the general appearance of the growth "is essentially the same as the common embryoma of the ovary or testis."

Chavannaz and Nadal report two cases. The first is an adenomyochondrosarcoma. The second they term an epithelial chondromyo-

*Read at a meeting of the New York Obstetrical Society, February 12, 1924.

sarcoma. This growth was composed of cylindrical epithelium, epidermal type of epithelium, sarcomatous tissue, and nodules of cartilage.

Fig. 1.—Uterus laid open, showing extent of tumor. Note hypertrophy of myometrium.

Fig. 2.—Photomicrograph, low power. Above, a glandular acinus lined with high cylindrical epithelium. Note that this is not endometrial in type. Below, an area of cartilage extending across the field.

These seventeen cases show the following common characteristics. The tumors spring from the corporeal endometrium. They are made

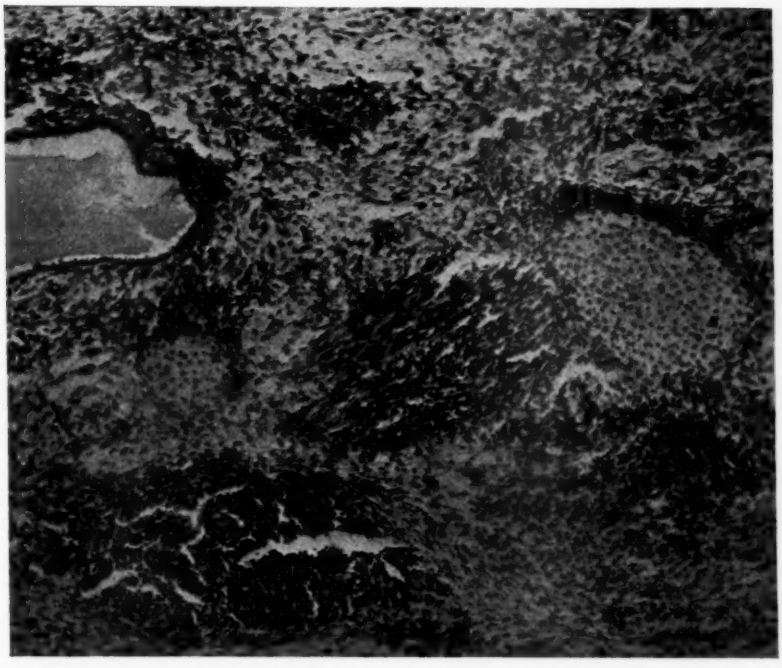

Fig. 3.—Photomicrograph, low power. Irregular connective tissue stroma. A glandular acinus to the left; a nest of cartilage cells to the right; a sarcomatous area adjacent to the cartilage.

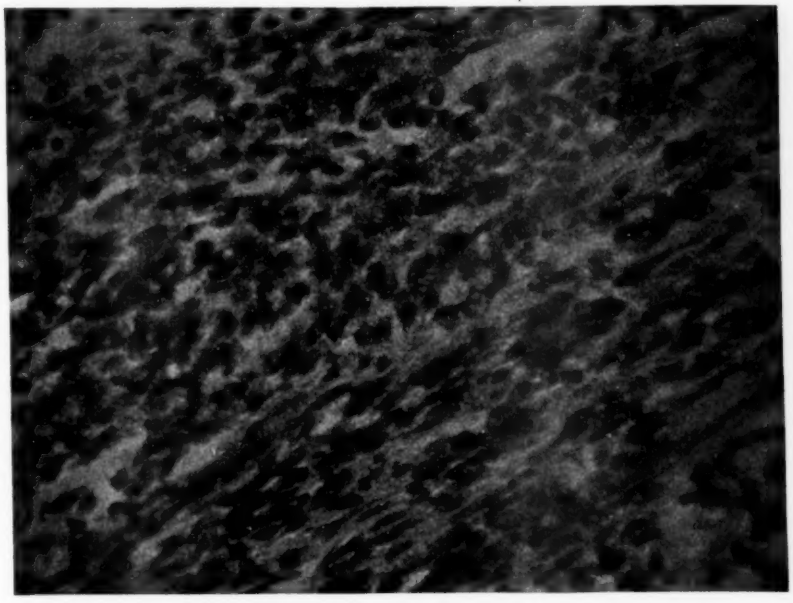

Fig. 4.—Photomicrograph, high power. The area of large round cell sarcoma shown in Fig. 3.

up of connective tissue, various types of sarcoma, islands of cartilage, and epithelium of different types. The epithelium is usually found lining glandular alveoli, and often differs markedly from the endometrial type. Myxoma-like tissue is also a frequent finding. Such growths have all the characteristics of teratoma and merit being classified as a clinical and pathologic entity—teratoma of the uterus.

To attempt to discuss the histogenesis of this type of tumor is to wander far afield into the realms of speculation. The most plausible theory we have ascribes them to the development of cells which are a fetal inclusion in the body of their host.

Clinically these tumors largely assume the characteristics of sarcoma, especially in their rapid growth and the large size to which they attain. As a rule they come to the attention of the clinician as polypoid masses protruding from the cervix. The broad pedicle and central portions of these are firm and fibrous. The peripheral portions are apt to be soft, edematous, and even necrotic. They grow rapidly and have the irregular profuse bleeding common to other malignant tumors.

Pain, severe and cramp-like in character, is an earlier symptom than in carcinoma, and is due to attempts at extrusion of the large intrauterine mass. Metastases may be local, or in far distant regions of the body, as in other forms of highly malignant tumor. The history of the case I wish to report follows.

Mrs. J. H. R., fifty years of age, was first seen in consultation *with Dr. H. M. Koles* on October 24th, 1923. There were no points of special interest in her family or past history. She had two children, the last fourteen years ago. There had been two abortions in the second month, the last sixteen years ago.

The menstrual history was normal until the menopause which occurred a year before she was first seen by me. There had been no vaginal bleeding whatsoever from October, 1922, until June, 1923. At that time there was slight spotting of dark blood for one day. About the middle of September spotting began again. This gradually increased until the bleeding became profuse, and was associated with severe cramp-like pains. When I first saw her she had been bleeding more or less continuously for five weeks.

Examination showed a small, frail, poorly nourished, markedly anemic woman. The general physical examination was otherwise negative. There was moderate bleeding. There was a firm polypoid mass, protruding from the os uteri about five centimeters into the vagina. The uterus was hard, slightly enlarged, but regular in contour; the adnexa were negative.

The next day the cervix was dilated under ether anesthesia. With this there was an escape of considerable masses of soft necrotic tissue from the uterine cavity. The polypoid mass was twisted off. It was noted that it sprang from a broad fibrous pedicle whose point of implantation high up in the uterus could not be exactly determined. A finger was passed into the uterus and it was found to be empty. The endometrium felt smooth and regular except at the fundus where there were two small, slightly elevated ridges. Curettage brought away practically no tissue.

The polypoid mass removed was eight centimeters long, and about three centimeters in diameter. Its central portion was firm and fibrous, while portions of its

periphery were soft and necrotic. Scattered through its substance were small isolated very hard areas, varying in size from that of a pea to pin head. These proved to be areas of pure cartilage.

The polyp was submitted to Dr. F. S. Mandlebaum, pathologist to Mount Sinai Hospital, who pronounced it to be "a fibromyxochondrosarcoma, containing islands of glandular tissue; in other words, a tumor of teratoid nature."

Study of sections of the tumor showed an irregular connective tissue stroma. There were large areas of cartilage. Some of these were surrounded by myxomatous tissue; others by undifferentiated connective tissue, rich in blood vessels. Some fields contained masses of large round cells, with many small blood vessels, and all the characteristics of sarcoma.

There were also present glandular acini, some of which were completely filled with epithelial cells. There were a few transverse sections of spaces lined by high cylindrical epithelium. This differs very much from the endometrial type of epithelium.

After the removal of the polyp all bleeding ceased, and the cervix closed. In view of the anemic and generally wretched condition of the patient, it was decided to wait and build up her strength before proceeding further. Meanwhile she was kept under close observation.

In spite of urging it was not possible to obtain the patient's consent to further operation until December 12 when there was renewed bleeding and pain. At that time it was found that the uterus had enlarged to the size of a three months' gravidity. It felt hard and somewhat irregular in contour, but was freely moveable. The cervix was closed.

The patient was admitted to Mount Sinai Hospital where a laparotomy was performed. On opening the peritoneum the uterus was found uniformly enlarged, hard and smooth. Both adnexa were normal. The peritoneum was everywhere smooth and shiny. There were no adhesions, no masses in the liver, mesentery, or intestine, and no infiltration of the parametria. A typical panhysterectomy and bilateral salpingooophorectomy were performed. The patient made a good operative recovery, and to date (May, 1924) has gained in flesh and strength.

Specimen:—uterus with normal adnexa. The uterus the size of a three months' pregnant organ, its peritoneal coat smooth and shiny. Upon incising the uterus in the midline on its anterior surface the picture represented in Fig. 1 presented itself—a tumor mass filling the uterine cavity, extending from the fundus almost to the level of the internal os. In the fresh state the tumor was of a yellowish color and had a somewhat translucent appearance. To the touch it was firm and fibrous. The myometrium was hypertrophied, and there was about half a centimeter of uninvolved muscle tissue between the tumor and the peritoneum.

Microscopic examination of the tumor showed it to be identical in structure with the polypoid mass previously described. Undoubtedly this had sprung from the tumor itself in the uterine wall. Sections from the ovaries showed them to be normal.

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67 WEST EIGHTY-NINTH STREET.

(*For discussion see page* 219.)

REPORT OF TWO CASES OF DIAPHRAGMATIC HERNIA

By J. D. Clark, M.D., Wichita, Kansas

SINCE the World War there has been a deluge of case reports of diaphragmatic hernia. These have been almost entirely of traumatic origin and are of interest primarily to the surgeon. Having seen two congenital cases of defect of the diaphragm in the course

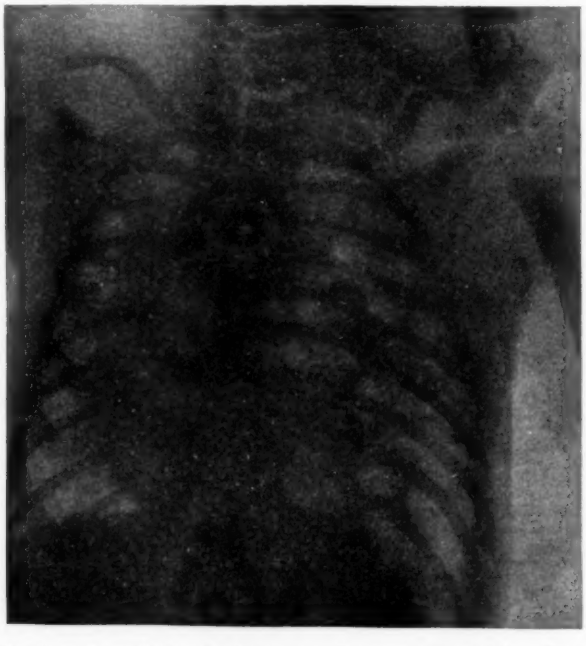

Fig. 1.—Showing heart to right of sternum and numerous small coils of intestine in left chest.

of private practice in the past four years, I cannot but wonder whether this is not more common than we have considered it in the past. The first case, I frankly overlooked and found postmortem.

The mother was a healthy primipara, twenty-four years old, who passed through a normal pregnancy and labor. The baby, a well developed and apparently healthy boy, weighed eight pounds. He had recurring attacks of dyspnea with cyanosis that lasted from a few minutes to several hours. The heart was on left side of sternum during free intervals. He died suddenly when two weeks old in an attack of dyspnea. He nursed well when not prevented by the shortness of breath. Autopsy showed a defect in the left side of diaphragm,—the opening the size of a fifty cent piece had distinct thickening of its edges. There was no peritoneal sac. The left lung was collapsed, but had air in it and could

be inflated. The stomach and all small intestines and ascending and transverse colon were in left chest.

The second case was the third child of a healthy mother, the other children being normal in every way. This was a boy baby weighing seven lbs. nine oz. He was born cyanotic and had not cleared up two days later. His cry was never lusty but of moaning character. He nursed with great difficulty and part

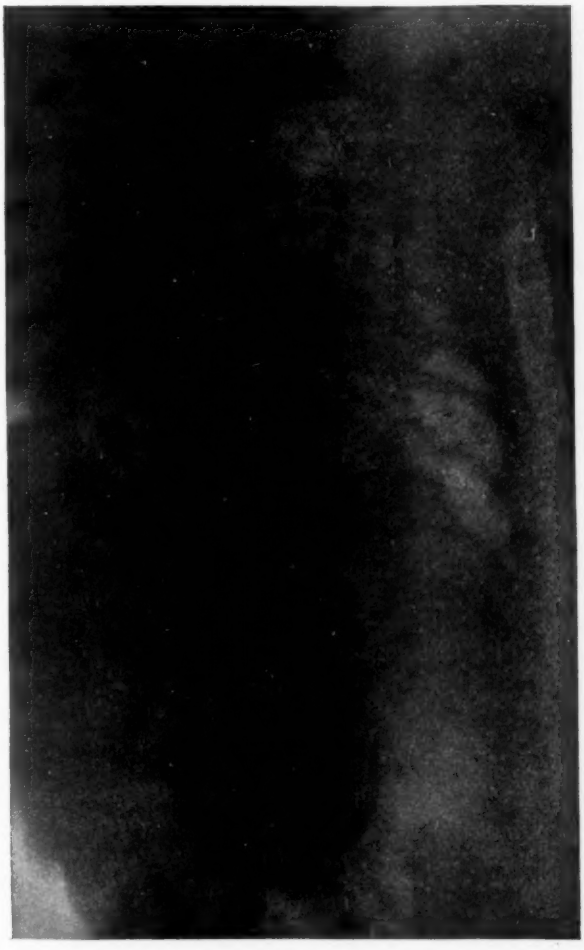

Fig. 2.—After barium in mother's milk already going through bowel in chest. Note size of stomach in a 7 lb., 9 oz. baby.

of time could not nurse at all owing to dyspnea. There was a large amount of flatulency that could not be entirely relieved by enemas.

On physical examination, the heart was to the right of the sternum, right chest resonant on percussion, and breath sounds were always normal over right side. The left chest was tympanitic and at times gave sounds of percussing over a cavity. There was always absence of breath sounds over whole left chest. At one or two examinations, gurgling could be heard on left side.

Diagnosis of diaphragmatic hernia was made and verified by x-ray (Fig. 1).

The following day by adding barium to the mother's milk, the other plates were obtained. The baby died on the sixth day.

Postmortem Examination.—The jejunum ileum ascending (except caput coli) and transverse colon were in the left chest. There was no peritoneal sac. The defect extended from the columnar attachment to the vertebra in a curved line across to the midaxillary line, ending in a sharp point. There was no thickening

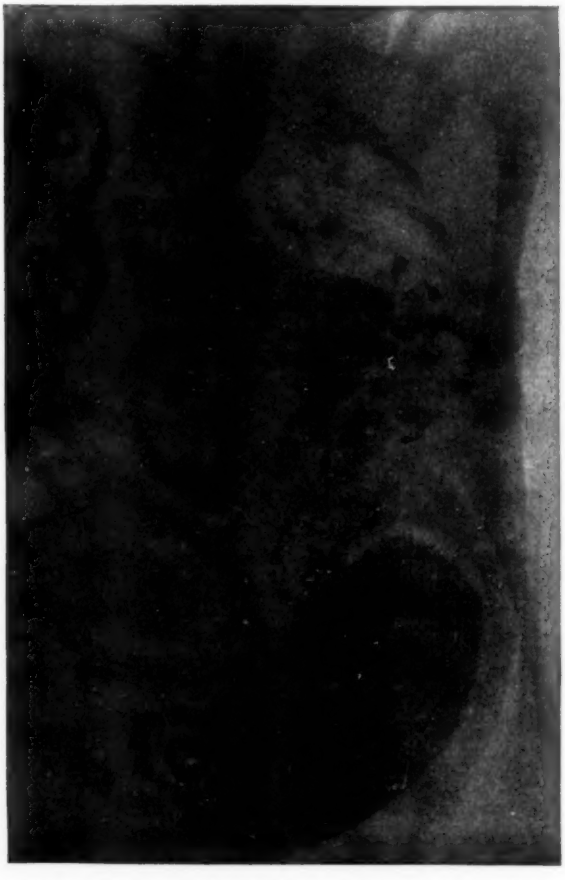

Fig. 3.—Shows advancement of barium and partially emptied stomach.

of the edge of the defect in diaphragm nor any line around posterior chest wall to show where chest cavity and peritoneal cavity joined. There was a small tag of tissue in the apex of left chest—all that remained of the left lung.

This case differed from the other in never having complete relief of dyspnea, size and shape of defect, and the difficulty with which it could be closed. Owing to the size and shape of the defect, I was struck by the ease with which the left kidney could be rotated upward and anchored to the edge of the opening, thus completely closing the latter.

ORPHEUM THEATRE BUILDING.

Society Transactions

NEW YORK OBSTETRICAL SOCIETY

MEETING OF FEBRUARY 12, 1924

THE PRESIDENT, DR. F. A. DORMAN, IN THE CHAIR

DR. S. WIENER reported a case of **Mixed-Cell Tumor of the Uterus.** (For original article see page 211.)

DISCUSSION

DR. HAROLD BAILEY.—I would like to ask whether it is necessary to use x-ray or radium as a further treatment in this particular case.

DR. ASA B. DAVIS.—The speaker has just reported that he found this condition in the uterus and that some weeks later a panhysterectomy was done. I did not suppose that it was considered good surgical treatment to wait so long.

DR. S. WIENER (closing).—I believe that radiation is just as much indicated in this particular type of malignant tumor as in any other.

With respect to Dr. Davis' question about the length of time which elapsed, the patient was in a very wretched condition from the bleeding and I intended to wait but a very short time before going ahead, but it was almost a week before we knew the exact nature of this growth. The pathologist at first was very much in doubt because he personally had never seen such a condition, and after I was ready to go ahead, neither the patient nor her husband was willing, despite urging, and it was only when she began to bleed again, as I told her she surely would, and to have pain, that they consented to further operation.

DR. FLOYD E. KEENE, of Philadelphia, (by invitation) presented a paper entitled **Contraindications to Radium in the Treatment of Diseases of the Female Pelvis.** (For original article see page 201.)

DISCUSSION

DR. HAROLD BAILEY.—I have been especially interested in his conclusions from the standpoint of the benign tumor—the fibromyoma—and agree with him in almost every particular. In the presence of a large tumor, or a pedunculated tumor, either outside of, or within, the uterus, or in the presence of pain which indicates other pathology, surgery is indicated, and I feel from my short experience that the most disconcerting and troublesome results come from attempting to treat these fibromyoma with radium.

I believe that a young woman with menorrhagia of indefinite origin should be treated with radium with a very careful consideration of all the facts. To absolutely sterilize a woman with a dose of radium seems unnecessary, nevertheless it is probable that a dose of radium that merely limits the menorrhagia and that

allows her to go on ovulating may be dangerous from the point of view of future impregnation.

I disagree with Dr. Keene in regard to early carcinoma of the cervix. I believe that this is a condition in which radium treatment is certainly applicable here because a dose may be conveyed out to the parametrium that will prohibit the growth of cells within a certain radius of the cervix. These remarks presuppose that umassive amounts of radium are available to the operator.

I agree with the doctor's statements that carcinoma of the body of the uterus should be removed by hysterectomy. Contrary to his views, I feel that radium should first be implanted in the body of the uterus to render inert the cells that are present. However, I do not take the position I took several years ago that there should be a long interval between the irradiation and the operation. I believe that if a dose of radium is implanted in the body of the uterus in cancer of the body, the uterus should be removed in seven or eight days.

DR. JOHN O. POLAK.—The value of radium in fibroids and other uterine hemorrhages is dependent on the diagnosis and its employment should not be entrusted to the hands of the roentgenologist or the radiologist. The more I see of these cases the more convinced I am that what Dr. Keene has said is true, particularly in these fibroid cases that are associated with unexpected anemias. These are the cases in which in the past we have used radium and subsequently had to operate upon and we found that degeneration, and that the anemia cleared up when the tumor was removed, and that it was the result of an absorption from the tumor.

With the use of radium in the hemorrhages of young girls, we have had considerable experience. We have followed a number of these girls through pregnancy and child birth and while Dr. Bailey feels that radium may have some lethal effect upon the unborn fetus, I am convinced from my clinical experience with cases that have subsequently become pregnant and have been delivered, that the judicious use of radium for these so-called myopathic hemorrhages in some of the young women has not the effect that Dr. Bailey claims on the unborn child. The use of radium in small dosage in these patients does not interfere with their subsequent menstrual life to any very great extent. The younger the patient the more chance she has of re-establishing her menstruation, even when we use a dosage that is rather larger than that suggested for the correction of some of these hemorrhages because of the fact that the deeper and younger follicles that subsequently come up toward the ovarian surface are not destroyed by short irradiation.

There often is the difficulty, even under anesthesia, of making a diagnosis of parametrial or adnexal lesions in the presence of fibromata, particularly if these lesions are the result of postpartum or postabortal infections. Radium seems to have a most stimulating effect in activating these lesions and causing very great subsequent trouble.

DR. W. P. HEALY.—There are certain points that may possibly be emphasized. As Dr. Keene has said, we more or less definitely agree that the submucous fibroid is one that preferably ought not to be treated by radium within the uterus, and yet occasionally that sort of treatment, may be tried. For instance, about three years ago I saw in consultation a woman who had an exceedingly bad cardiac lesion so that a competent internist here in New York City was of the opinion that under ordinary conditions she probably would not live more than five years. At this time she was having rather severe and annoying uterine bleeding which had only recently set in. She was about forty and weighed about 265 pounds, and was running a temperature which seemed to be due to the uterine condition. It was manifestly unwise to attempt a hysterectomy, the uterus was about the size of a 2½ months' pregnancy. I introduced two tandem capsules with a millimeter of

platinum filtration containing 100 milligrams of radium, into the uterine canal and irradiated the uterus. She had several submucous fibroids bulging into the uterine cavity which were apparently the source of the bleeding. The result was perfect, the local lesion cleared up. I saw that patient a few days ago, and she has had no bleeding from the uterus now for three years, and yet in the face of a temperature and submucous fibroids we irradiated the uterus.

Another great difficulty is that these tumors do not respond to irradiation very quickly. I use a somewhat larger limit for size than Dr. Keene mentioned. That is, I will irradiate them up to the size of at least a 4 months' gestation. Those patients do not show a quick response. Despite the fact that we warn them that the next menstrual period may be more profuse than the one they had before and that they need not be alarmed. Very often they do become quite alarmed and some near-by physician who is called in examines them and says: "Of course, radium has not done you any good, your tumor is still here." The result is the patient is at once discouraged and is taken to some near-by hospital and a hysterectomy is done, despite the fact that the surgeon in that hospital is informed that the patient has within a month been treated with radium. Yet when you do hold them off, it very seldom will happen that the patient will need a hysterectomy. I think it is a little unfair for us to ask a patient to take a risk of mortality if we can encourage her to wait a while.

Then there is the question of using radium to control the bleeding in the young woman. There is always an element of risk that is sometimes going to be very embarrassing for the man who uses radium, especially if he allows himself to become a little bit enthused in his dosage. I would far rather have the patient return to me six months later and say that she is still bleeding too much than to have her keep coming back to me six months or nine months or a year later and ask when she is going to have her menstrual period, and neither you nor I can tell from the gross appearance of the curettings just the type of tissue we are dealing with. A small dose of radium, not more than 500 milligram hours will stop the menstrual period almost permanently in young women if there is a good deal of lymphoid structure in the interglandular tissue. In other words, if the supporting network, the supporting tissue of the endometrium is largely lymphoid in structure, you may have a complete destruction of that and no regeneration. So I feel very keenly that the first treatment of the young woman should be merely a curetting and then get the pathologist's report, and if the bleeding returns and the endometrium is normal, with no excess of lymphoid tissue, you may, if you see fit to do so, use radium later; but the first application of radium in these cases is always a great gamble, and while we have done it safely, I am becoming more and more apprehensive about it the further and longer I deal with it.

DR. H. N. VINEBERG.—One of my cases was a woman who came to my office in a most nervous, excitable condition; in fact, the entire family, husband and daughters came with her. The patient had been radiated at the Memorial Hospital and said she was told she had cancer. She had a fibroid uterus the size of about a six or eight weeks' pregnancy, with no signs of malignancy. She was forty-four years old. I removed the uterus and she has been perfectly well and no longer has any fear of cancer. That was one of the strong points in Dr. Keene's paper, that in a great many of these women the moment you mention radium to them they develop a cancer phobia.

The other case was somewhat similar to the one already mentioned. In this case the patient was just simply frightened out of her wits. In her case the radium also had not been effective, her hemorrhage had continued, and on opening the uterus (it was not a very large uterus), there was a good-sized submucous fibroid which evidently had not been influenced by the radium.

DR. F. R. OASTLER.—May I ask Dr. Keene what experience he has had with the high voltage x-ray in the after-treatment of cases operated on for carcinoma of the cervix? In other words, whether it is the opinion of his clinic that it is better to use high voltage radium or low voltage radiation. I ask this question because during the past three and a half years that we have been using the high voltage current I have come to the conclusion that in almost every case, aside from possible benefit to the malignant disease, we are doing a very serious injury to the patient in its treatment.

DR. S. H. GEIST.—A question that has aroused a great deal of interest is the so-called myopathic hemorrhage, which is not a myopathic hemorrhage, because, as far as we can appreciate, there is no lesion or disease in the musculature of the uterus. The same precautions there as in the fibroids must be taken; that is, an attempt made to classify the type of so-called myopathic or essential hemorrhage. Recently Halban has described a group of these cases in which pelvic irradiation was carried out without effect, the hemorrhage not being influenced, and he found in examining the blood, a condition of extremely lowered platelet count. In several cases they radiated the spleen, and in one instance in which splenectomy was done the patient was absolutely cured without any ill effect on the pelvic apparatus. That is very important. If we can classify the types of so-called essential hemorrhage into those groups due to a lesion in the ovary and those due to a lesion in the blood vascular system or an endocrine dyscrasia, such as the thrombocytopenic or the purpuric type, it will mean another step forward in the limitation of the cases that should be operated on and those that should not be operated on, and then, in the former class, we will be able to avoid waste of time and possible damage to the uterine organs by the use of radium or x-ray.

DR. KEENE (Closing).—Regarding irradiation in young women, I cannot agree with Dr. Bailey in his point at all. Our experience has been the same as that of Dr. Polak. In other words, we lay great stress upon the fact of not using radium in treating myomata in young women, as I brought out in the paper; so commonly do we come in contact with what is called myopathic, ovarian and essential hemorrhage, the cause of which we do not know in young women in whom we hesitate to do a hysterectomy, in whom curettage is only of temporary benefit at the best, that our hands are tied and something must be done to control the bleeding. Under these circumstances we feel we are justified in using radium, but in using it in extremely small quantities. The younger the patient the less the dose of radium. It is better to underradiate than overradiate. For example, in women under thirty years we wouldn't think of giving more than 200 milligram hours, trying it out and explaining to the patient that perhaps there may be a recurrence. It is better to give a little dose, perhaps a little larger the second time, or even to subject the patient to hysterectomy rather than use a large dose of radium.

So far as pregnancies are concerned, we have had 5 patients who became pregnant following irradiation. Our experience has been that there has been no harm done in that respect.

In the treatment of fundal carcinoma, I think Dr. Bailey's suggestion of using a preliminary irradiation is a very wise precaution.

I think Dr. Healy brought out a point that we should impress upon our patients before leaving the hospital. In other words, we make it a rule after irradiation to explain to the patient what she may expect. We tell her that the first period succeeding the irradiation may be more profuse than normal, just as profuse as it was before, or that it may be scanty, or not come on at all. We cannot prophesy what will happen after the first irradiation, but the second period after irradiation will not appear, or will be very scanty, if a full dose is used. In about 75 per cent of cases a discharge will develop. We tell the patients just what is likely to happen

and in this way they are not so anxious as they would be if the situation were not fully explained to them.

Dr. Vineberg brought up a point which I think is extremely important, especially as regards nervous women. We have not seen this contraindication given, but we feel it is a very important one. In very highly nervous women I am confident that they stand operation better than irradiation.

So far as Dr. Dickinson's question regarding the 50-50 chance of the patient receiving either radium or surgery is concerned, I would state that I was speaking of so-called myopathic hemorrhage and myomata, not just myomata alone.

In regard to Dr. Oastler's question relative to high voltage x-ray, I would say that we are not yet prepared to express an opinion. The apparatus has been in use in our clinic only during the last year and a half and Dr. Pancoast, who has been in charge of this work, is not willing to express an opinion one way or the other as to the value of the high voltage treatment. Personally, I am very dubious about it. Patients are very much upset by the nausea and vomiting that they sometimes experience and it is often most alarming. If there is to be a permanent result on the cancer, however, the temporary discomfort of the patient is not to be considered, but I am still of an entirely open mind as to the advisability of such a procedure.

In reference to Dr. Geist's question regarding the x-ray of the spleen, considerable has appeared especially in the German literature, as to the advisability of splenic irradiation and as to the results that may come from it. I think it is a rather difficult matter to determine exactly the cause of this bleeding; in other words, to determine whether it is uterine or endocrine. I think most of it is endocrine. Polano years ago brought out the fact in his excellent study that we cannot demonstrate anything in the uterus, either in the musculature, the endometrium, or the blood-vessels that in any way differs in the bleeding and the non-bleeding uterus. He believed (and I think he was right) that it was due to some alteration in ovarian secretion or some upset in balance between the secretion of the ovarian or other internal secretion glands. We have not used splenic irradiation except in one case of purpura, but what the result will be it is too early to say.

DR. HERMANN GRAD presented a paper entitled **End Results After Operation in 53 Cases of Uterine Prolapse.** (For original article see page 163.)

DISCUSSION

DR. RALPH WALDO.—There is one criticism I would make, I do not believe that any of us would state that procidentia starts after the climacteric period unless we have examined the patient beforehand, for in a large percentage of cases there is more or less first or second degree procidentia, where the patients take no notice of it. Many of these women only recognize that they have what they call "falling of the womb" when it comes out, and you might have a first or second degree procidentia and it might develop long before the climacteric is reached and still it would not appear in the history.

DR J. M. MABBOTT.—This is practically a clinical study of Dr. Grad's cases from his own standpoint.

To classify labors as normal or abnormal from the standpoint of instrumental delivery or not is very unsatisfactory. A good many cases get through without forceps long after they cease to be normal cases and should have had forceps, and I have always thought that where forceps are unnecessary they are harmless.

DR. JOSEPH BRETTAUER.—I appreciate the amount of work which this paper represents, but the results are not conclusive. As shown in Table IX, of the

small number of cases reported, twenty had not been observed even as long as one year; furthermore, in compiling statistics of this kind, the personal element often predominates, as a recent experience of my own clearly shows. In our Follow-up Clinic a case was brought to my attention in which the final result was recorded as perfect by one of my associates, whereas I would pronounce it as only moderately successful. The value of statistics would be greatly enhanced if the final results were reported after an examination of the cases by two or three disinterested colleagues.

DR. H. N. VINEBERG.—I would like to ask why Dr. Grad found it necessary to operate on so many cases in the first degree of prolapse, whether there were very marked symptoms so that an operation was indicated. A very slight prolapse in a young woman I should rather not consider an operative case at all.

DR. F. A. DORMAN.—I likewise agree that for the complete story we should know the types of labor and delivery. Of course, we must assume that Dr. Grad did not have these statistics at hand. These cases of procidentia, of course, are marked as failures in an obstetric "follow-up." It is important to know whether we fail by interfering with forceps in these cases or whether we interfered too early, or whether we delayed too long and did not apply our forceps soon enough. From my own personal observation it seems that many cases of procidentia occur in protracted labors in which there was no application of forceps and the fact that forceps were used proves nothing.

DR. HERMANN GRAD.—I fully agree that these procidentias in climacteric cases probably occur long before they cause symptoms and come for operation. The patient is asked how long she was troubled with the procidentia.

As to Dr. Brettauer's remarks about how the percentages of operations are obtained, I would say that the figures are obtained by taking a certain number of operations in a certain number of cases, of first, second or third degree of prolapse, the figures show that practically the average number of operations was about the same for all three degrees of prolapse.

I will answer Dr. Vineberg about the first degree of prolapse operations simply by saying that every one of those cases had definite symptoms. Even though the prolapse was a first degree prolapse the patients had symptoms with cystocele, rectocele, or the cervix coming down to the vulva.

I also agree with Dr. Dorman that we haven't enough statistics to be able to tell definitely about instrumental or noninstrumental delivery. All we have in these cases is whether they are delivered with instruments or not, and the study shows that instrumental delivery does not seem to have anything to do with procidentia uteri.

THE NEW YORK OBSTETRICAL SOCIETY

MEETING OF MARCH 11, 1924

THE PRESIDENT, DR. FRANKLIN A. DORMAN, IN THE CHAIR

DR. HIRAM N. VINEBERG presented the following case reports: (1) **Septic Thrombophlebitis of the Left Ovarian Vein Complicating a Fibroid Growth of the Uterus.** (2) **Septic Thrombophlebitis of Right Ovarian Vein Following Curettage of a Non-Pregnant Uterus.**

(1) C. S., a spinster, aged forty-five, a highly intelligent principal of one of the public schools in the City consulted me first on Nov. 16, 1921.

She stated she had not been quite well during the entire summer. She felt nervous and tired most of the time and attributed her poor health to the strain of having to take care of her bedridden mother. She had not resumed her school duties as she wished to rest and regain her strength. For the two or three weeks prior to coming to see me she suffered from what she termed uneven temperatures, having hot and cold spells (these were chills and fever as was revealed later) but paid little attention to them, looking upon them as symptomatic of the beginning of the change of life. For several weeks her left lower extremity would swell during the day but the swelling would disappear on rest or when in bed during the night. Had pain off and on in her right arm which she still felt at times. There was a feeling of weight in the lower part of the abdomen, but no definite pain. Five years before she suffered from menorrhagia. At that time a fibroid polypus was detected and removed *per vaginam*. Since then the menses had been regular, of normal amount and duration, lasting from four to five days,—no clots, no pain.

The patient was stout, above the average height with a marked sallow complexion. The pulse was 84, of good quality, the temperature normal and the urine was free from albumin and sugar. On examination a hard slightly nodular tumor was found filling rather snugly the whole of the lower half of the abdomen. The cervix passed into the tumor mass which seemed moderately fixed.

The diagnosis was made of multiple fibroid tumor of the uterus with pressure symptoms. Operation was advised and accepted. She entered the Flower Hospital, Nov. 20. On admission her temperature was 100.4° and pulse 100. Next morning the temperature was normal. That afternoon at 2 P. M. however, she had a severe chill lasting thirty minutes, which was followed by a temperature of 105° pulse 128 and respiration 40. Shortly afterwards Dr. Morris Manges made a most careful and thorough examination with practically negative results. A blood count showed leucocytes 28,400, neutrophiles 94 per cent, lymphocytes 6 per cent, no plasmodia. The urine showed a faint trace of albumin. At 8 P. M. the temperature had dropped to 100.8°, pulse to 100 and the respiration to 20. At 9:45 she had another chill of less severity. The temperature rose to 103°, pulse to 136 and the respiration to 24. November 22, 8 A. M., temperature 102°, pulse 100, respiration 24.

I learned now on closely questioning the patient that the uneven temperatures to which she had referred when taking her history in my office, were distinct chills lasting from 10 to 20 minutes and were followed by fever, how high she did not know. She stated she had had four such attacks during the prior two weeks. The

inference was now forced upon me that some acute process must be going on in the tumor, either necrosis, suppuration, or what was more probable, a red degeneration of one or more of the nodules, and that surgical intervention should not be further delayed. Accordingly, about 2 P. M. of that day when the temperature was nearly normal, I performed a panhysterectomy, removing the tumor, cervix and adnexa *en masse*.

When the abdomen was opened it was noted that one of the fibroid nodules, the size of a tangerine orange, made the impression of being the seat of red degeneration and hence, doubtless the cause of the chills and fever. In this we were mistaken, as subsequent events proved. The sigmoid was quite extensively adherent to the left infundibulopelvic ligament. When the adhesion was separated sufficiently to expose the left ovarian vessels it was noted that the peritoneal covering was of a dirty gray color and moderately infiltrated. While the condition was recognized by me at the time as something unusual and as far as my experience went, I did not deem it wise, under the circumstances, to make any further investigation but to remain content to apply a ligature around the vessels as high up as I could.

I was especially loath to prolong the operation, inasmuch as considerable technical difficulties had been encountered owing to the very thick abdominal walls, the great abundance of properitoneal fat and the tight fitting of the tumor in the true and false pelvis. The difficulties were very much enhanced by the poor anesthesia, the patient developing deep cyanosis so that the operation had to be stopped a few times until the cyanosis grew less. Nevertheless, the operation was completed in an hour and a quarter, with practically no loss of blood. There was apparently very little shock and the patient reacted very satisfactorily.

A gross and microscopic examination of the tumor showed no changes other than thickening of the walls of the blood vessels. Both ovaries showed evidences of a chronic inflammatory process and the left ovarian vein was occluded by a thrombotic clot.

Nov. 23. First day, 8 A. M., T. 98.6°, P. 92; at 8 P. M. T. 99°, P. 100, R. 24. At 9 P. M. had a chill of five minutes followed by a temperature of 101°, pulse 116. Nov. 24—second day postoperative, 8 A. M., T. 99°, P. 92, R. 24; 8 P. M., T. 101°, P. 116, R. 24.

As the pathologist's findings in the tumor did not explain the chills prior to the operation and the recurrence of the chill after it, an x-ray was taken of the teeth. This the dentist thought showed evidences of infection of two of them. These he extracted the next day. On macroscopic appearances the roots seemed fairly normal. Cultures, however, taken from them showed streptococci.

November 25: 3rd. day postoperative, 8 P. M., T. 100.6°, P. 108, R. 24. The patient had a comfortable day. No distention; passed flatus freely.

From this day on until the exitus on the twenty-fourth day patient had one or more chills daily with temperature varying from 98° to 105°. During the period of low temperature she was bright and looked as if there was nothing the matter with her and said she felt very well, but with the rise of the temperature she became very restless, moaned considerably and was more or less delirious.

The sutures were removed on the tenth day. There was perfect primary union. On bimanual examination no exudate was to be felt in the pelvic cavity or lower abdomen. There was, however, a profuse purulent discharge escaping through the left side of the vaginal opening. A blood culture was taken Nov. 29, seven days p. op. and again Dec. 12, nineteen days p. op. Both were negative.

On the recurrence of the chills after the operation, I reached the conclusion there was a septic thrombophlebitis of the left ovarian vein which was extending upwards and that the only chance the patient had lay in reopening the abdomen and excising the affected vein.

With this in view, various consultations at different times were held. After some discussion with each I gained a concurrence with my diagnosis, but none would agree to my proposition of surgical intervention. Each one expressed the confident view the patient would recover with the general treatment that was being carried out. It is only fair to say that each consultant happened to see her in the nonfebrile stage when she was placid and apparently in good condition. The last two days there was constant delirium. The temperature rose to over 106°, pulse to 130 and more, and she finally succumbed on the twenty-fourth day after operation. A couple of days before exitus a small patch of bluish purple discoloration appeared over the inner surface of the large toe of the left foot. It had a fairly defined line of demarcation.

Autopsy examination showed the left ovarian vein for three inches above its ligation was about the size of the thumb and the seat of a purulent thrombus. Beyond this to its entrance into the left renal vein it was patent and normal. The wall of the left iliac vein on section was found thickened in sections and contained a soft clot. A polypoid vegetation one inch across at the base and nearly one inch in height was found on the left mitral valve. The usual evidences of general sepsis were found in the kidneys and spleen.

The impression gained on witnessing the autopsy was very strong that had I been permitted to carry out my advice as soon as the chills recurred after the operation, in all likelihood the patient would have recovered.

One element of doubt presented itself in the discovery of the mitral polypoid vegetation. It was not easy to determine whether this was primary or secondary to the vein affection. Most likely the latter.

The two very competent internists who examined her, the one only shortly before the other a few days after the operation, detected no evidences of heart lesion.

I have had a fairly thorough search of the literature made and no similar case was found.

(2) On January 7, 1924, a physician brought to my office for consultation, a very large, stout woman with pale mucous membranes. She was forty-four years of age, married twenty-three years, had five children, the last seven years ago, and two miscarriages.

For some time past the menses had been very profuse. She had now been bleeding steadily for three weeks and was passing large clots, with cramp-like pains. The uterus was enlarged 100 per cent and felt quite hard. The cervix was large but not lacerated and presented no erosions. The adnexa were not palpable.

A diagnosis was made of fibrosis uteri but the bleeding was so profuse that one had to think of a probable small submucous fibroid. Of course adenocarcinoma could not be definitely excluded.

I expressed the opinion that if one could eliminate the presence of a submucous fibroid or adenocarcinoma, it would be a suitable case for radium treatment. Hence a curettage should first be done and if the material obtained proved nonmalignant, then one could apply the radium.

Jan. 19, twelve days later, the same physician asked me to come to see the patient at her home. I learned from him that he had curetted her on Jan. 8, (11 days before) that she had a severe chill on the next day followed by a temperature ranging from 102° to 104° and a pulse from 100 to 120. He stated that two or three days later he dilated the cervix with uterine dressing forceps and that a fairly large quantity of purulent fluid escaped. The temperature then gradually fell to normal where it remained for two days, but on the morning of the day I was called the patient had another severe chill and the temperature rose to 104°, pulse 120. I found the patient looking very ill, the tongue heavily coated with a white fur, the abdomen moderately distended but not rigid. On bimanual examina-

tion the uterus was found as on the previous examination. There was no exudate to be made out nor any point of distinct tenderness.

The impression gained was that in all probability an infection had occurred either of a submucous fibroid, or of the endometrium. The patient was admitted to the hospital for observation and treatment. On the following morning the patient looked less ill than the evening before. The tongue was not as dry or as heavily coated. Temperature 100°, pulse 90. There were no signs of general peritonitis. The blood showed 70 per cent hemoglobin; 3,886,000 red cells; 9,400 white blood cells; 80 per cent polynuclear.

In view of what had taken place before and the uncertainty of the pathologic condition present, I concluded it would not be wise to wait any longer for surgical intervention. Accordingly, on the afternoon of the following day, Jan. 22, I performed a panhysterectomy, removing the uterus and cervix and adnexa *en masse*.

The right ovarian vessels were found infiltrated, forming a mass the thickness of the thumb. The swelling extended apparently as high as the vena cava. After removing the uterus and adnexa I directed my attention to the affected vein. I found it impossible to shell it out from its bed, so intimately blended was it by exudate with the adjacent tissues. I, therefore, incised the wall of the vessel and the peritoneum covering it, and shelled out the semisolid and purulent clot which reached almost to the vena cava. I then sutured together the walls of the vessel and inserted a narrow strip of iodoform gauze into the canal thus created, carrying the free end into the vagina. The peritoneal and fascial layers were closed in the usual way, a strip of iodoform gauze was placed at the bottom of the fat layer and the edges of the skin coated by sterile adhesive strips.

The pathological report showed the uterus the size of six weeks' pregnancy, 12 cm. x 10 cm. x 8 cm. Upon section numerous minute foci of suppuration were visible.

Microscopic examination of uterus showed a polyplastic infiltration of all the coats of the uterus, polynuclear and round cells predominating. The endometrium was sloughed in some areas. Throughout the muscle wall were numerous microscopic abscesses. Both the mucous membrane and muscle wall showed occasional areas of necrosis. Examination of specimen from thrombus showed the usual structure but with extensive infiltration of round cells and polynuclears. Section from tubes showed infiltration of all coats with round cells and polynuclears: section from both ovaries showed round cell infiltration.

Diagnosis.—Acute suppurative endo- and myometritis: purulent thrombophlebitis, and acute salpingooophoritis.

The convalescence was not what might be termed stormy. At no time was there any reason for grave anxiety, but it was slow, with more or less fever. The fat layer did not suppurate but was tedious in healing and for a time did not look very healthy. However, its condition was not such as to account for the temperature. The kidneys and heart were negative. There was no exudate. The temperature persisting, I thought there might be some retention in the lumen of the sutured vein. With two fingers as a guide, I carefully passed a long uterine dressing forceps into the track left by the gauze drain and dilated gently, no pus or fluid of any kind escaped.

The temperature and pulse were practically normal on the 9th day and remained so for nine days. Then the temperature ranged from 99° to 101.3° for the following 10 days and the pulse between 84 and 90.

As the patient was very anemic and was not responding to injections of cacodylate of soda, I thought convalescence would be expedited by a blood transfusion. This was done on the thirty-fifth day. It was followed by a very severe chill and temperature rise to 104°. It took four days before the temperature again became

normal. The patient from then on gradually improved and left the hospital on the forty-seventh day in fairly good condition.

The abdominal wound was practically healed. She was free from pain and the examination of the pelvis and abdomen was negative as it always had been subsequent to the operation.

Septic thrombophlebitis is, as we all know, not an infrequent occurrence following a curettage of a pregnant uterus, but this was the first case in my experience, as well as I can remember, in which it followed a curettage of a nonpregnant uterus.

DISCUSSION

DR. HIRAM N. VINEBERG.—Whenever the question of ovarian thrombophlebitis has been raised heretofore and cases reported, it usually excited discussion.

DR. HALSEY J. BAGG (by invitation) presented a paper on the **Etiology of Certain Congenital Structural Malformations.** (For original article see page 131.)

DISCUSSION

DR. HAROLD BAILEY.—It seems to me that here we may have some clue to the injuries that we see so commonly as birth abnormalities and which are more frequent than we ordinarily believe. It is only necessary to review hospital statistics for the period of a year to learn the number of gross abnormalities leading to death that exist in a hospital service. One hospital service of 1300 deliveries had seven and, if we go back to Potter's report, in 1113 deliveries there were 9, probably the largest number of gross congenital abnormalities that has ever been recorded in such a small series.

We have been particularly interested in this problem from the standpoint of irradiation. We knew from clinical reports, as well as from the actual findings, that a woman with the fetus in her could not be irradiated with any surety of thereafter getting a normal child, and, of course, those cases that have been, by accident, so irradiated have received the treatment from the standpoint of enlargement of the uterus ascribed say, to fibroids. One report from abroad and a case reported by Dr. Little, in a discussion before the American Gynecological Society last year, stated in both cases that the fetus at the time of birth was alive but very much stunted, that it failed to develop in a natural manner and that it had the brain of an imbecile.

Of course, we have felt that irradiation of the parent would have considerable significance, and these experiments demonstrate that at least in mammals of the lower order this is true. From a clinical aspect these facts prevent us from treating women who have myopathic hemorrhage with a dose of radium that will keep them from flowing by affecting the ovaries for a certain length of time; we must treat them to absolute sterility. Therefore it seems to me that this experiment really has a practical bearing for us, as well as being of the greatest interest from the standpoint of the consideration of hereditary factors.

DR. I. C. RUBIN.—I would like to ask the doctor whether he would be good enough to compute for us the amount of x-ray or radium that would be equivalent to get a similar effect in a woman. In other words, if this is of value to us as clinicians, we ought to know how much of a dose would be safe.

The work is valuable to us in two ways,—for example, I remember an obscure case of pregnancy where an ovarian cyst or a fibroid was in question, complicating a pregnancy of more or less normal advancement where I suggested that an x-ray picture should be taken to clear up the diagnosis. Two consultants on the case, however, expressed it as their belief that the x-ray exposure for the purpose of getting a radiographic picture would have a lethal effect upon the fetus, and that,

therefore, I would be subject to criticism. I feel pretty certain today as I did then, and particularly from listening to Dr. Bagg's wonderful report, that a mere two, three, four, or five second's exposure of a pregnant uterus in the fourth or fifth month of gestation can have practically no effect upon the fetus either immediately or shortly after birth, or even later on in life.

The other point that we must bear in mind is the possible lethal effect upon organs, such as the eyes, kidneys, feet, etc., where women had been radiated for myopathic bleeding, etc. These may be young women, particularly in the stage of puberty and adolescence, who eventually get married and become pregnant. It is my impression that there have been a number of cases reported where there have been no abnormalities, although I am conscious of the fact, as reported by Dr. Bailey, Dr. Bagg and Dr. Matthews, that there are lethal effects. It would be well, therefore, if Dr. Bagg could tell us now, if possible, what the lethal dose for women would be, that might have its effect upon the fifth, sixth or eighth generations.

DR. JOHN O. POLAK.—Dr. Bagg's paper has filled me with a great deal of apprehension because in a total of 874 women of child-bearing age, radiated by us, there were 39 women who became pregnant. Out of that number there were 15 abortions. But 20 apparently normal babies born from these 39 pregnancies. These babies have been followed, and we have follow-up notes of these babies ranging from 2 to 5 years, and their health and development seems to be normal.

The doctor has suggested that the children and grandchildren will have these abnormalities. Now, the point that Dr. Rubin brought out is a very important one. Dr. Reuben Peterson was here recently and converted us to the idea of x-raying the pregnant uterus for diagnosis in obscure cases. He made the frank statement that after several years of work with the x-ray for diagnosis of pregnancy there have been none of these lethal effects observed, and I agree with Dr. Rubin that this paper suggested two very important things. First, what dosage is safe? Second, are these children whom we have followed up to this point liable to have children or grandchildren who will be abnormal?

I would like to report the case of a woman who was five months pregnant with inoperable cancer of the uterus that was growing very rapidly, on whom we used a very large exposure of radium. This woman went to term and had a section done and the child was a normal child.

DR. HAROLD BAILEY.—I would like to ask Dr. Bagg if he would express an opinion about the use of x-ray for diagnostic purposes in regard to pelvic measurements, during the first two months of fetal life.

DR. W. P. HEALY.—One point we must bear in mind is that Dr. Bagg in his experimental work radiates presumably a normal animal or a normal structure to bring about an abnormal condition. He is definitely experimenting to see if he can, starting out with something normal, produce something that will be abnormal; in other words, if some injury will result. We must bear in mind that women subjected to radiation have pathology to begin with, in the generative tract, otherwise we would not be radiating them, and if they have a pathologic defect in the uterus there is no reason whatsoever why they cannot have a pathologic defect in the ovary, or ovaries. Therefore, just because we will say that of these 39 women who did conceive after radiation in the series quoted by Dr. Polak there were 15 abortions, of course that is in no sense a reflection upon the use of radium, nor would it seem to indicate that possibly the abortions were the result of some injury to the ovary or the uterus in the application of the radium. The women who had abnormal uteri might not develop normal decidua; they would be apt to abort. In the same way they may have abnormal graafian follicles, so that we cannot necessarily compare,

it seems to me, the final results in these cases with the conditions that are brought about in the experimental work of Dr. Bagg.

Then, again, one point that impressed me in one of the charts was the apparently tremendous amount of inbreeding in his series. Of course, we all know that Dr. Bagg in reporting these results to us has controlled them by a similar series, probably in normal animals, inbred in just the same way and not exposed to irradiation, but, nevertheless, that is a point I would like to have him take up in the final discussion, as to why the inbreeding in itself might not bring about a defect that once got started in a normal animal.

DR. HERMANN GRAD.—About fifteen years ago one of my patients had a sarcoma in the abdominal wall. There was a recurrence after a few months and the patient was subjected to very severe radiations, so severe that for two and a half years she did not menstruate. I thought she was permanently sterile after that, but later she began to menstruate and became pregnant and had a normal female child that is now about 13 years old and is perfectly healthy.

DR. F. A. DORMAN.—I would like to ask Dr. Bagg whether he has made any study of the possible effect of the x-ray radiations on the placentae, to determine any possible relation to the hemorrhagic conditions in the fetus.

DR. HALSEY J. BAGG.—In regard to Dr. Rubin's question as to the amount of x-ray radiation used, I would say that the total dose in the 12-second experimental exposures amounted to about one-fifth of the human erythema dose. It is very difficult indeed to translate this experimental dose into the clinical doses that are being used every day. I must plead ignorance here at the very beginning, concerning what might be called a "safe" clinical dose, in the sense which you require and in the light of the experimental work I have presented this evening. The Hertwigs in their work with the lower vertebrates showed that while large doses of radium irradiation tended to produce death of the developing animals, milder doses were more apt to produce gross morphological abnormalities that were not incompatible with life.

In regard to the questions concerning the use of x-rays during the fourth or fifth months of pregnancy, I would say that a single exposure at such a period, would not, in my opinion, be likely to produce abnormalities in the mother or child, but that is, of course, still open to a good deal of investigation. The reason I mention this point is because I want to emphasize the fact that irradiation during the early developmental period, the first days or weeks of embryonic life, is more likely to produce abnormalities than irradiation later on. I am quite sure of this point. After the various organ systems have been completed and a considerable part of their differentiation is attained, then the disturbing reactions due to irradiation are apparently more likely to be upon the germ cells, which are still greatly underdeveloped, or possibly upon the endocrine organs. In this regard I do not want to make Dr. Polak more apprehensive than he is, but I would say that while the children he mentioned were born apparently normal after irradiation *in utero*, and do not show developmental disturbances of a gross order to the present date, still it is well to be on the lookout for the possibility of future abnormalities, sterility, etc.

In regard to Dr. Healy's remarks concerning the possibility that the experimental abnormalities in my animals were due to inbreeding *per se*, I would say that I do not believe that the inbreeding itself produces these abnormalities. Speaking from a biological point of view, there is considerable evidence, which it would not be worth your time at present to go into, which substantiates me on that particular point. I refer particularly to the extensive experiments of Dr. King, of the Wistar Institute. I have in my own laboratory a very closely inbred strain of albino

mice which I have kept for the last eleven years. The animals are normal, healthy and active. They apparently have never shown any sign of a hereditary defect that I could make out and I have purposely killed many of them to see if there were any abnormalities cropping up in the young *in utero*, or at birth. I am sorry that I cannot answer Dr. Dorman's question concerning the direct irradiation of the placenta. Irradiation of the entire animal *in utero* apparently did not affect the placenta if the treatment was given towards the end of pregnancy. Irradiation during early pregnancy produced a definite effect on the placenta and usually death and abortion of the animal.

NEW YORK ACADEMY OF MEDICINE

SECTION ON OBSTETRICS AND GYNECOLOGY

MEETING OF FEBRUARY 26, 1924

DR. EDWIN W. HOLLADAY IN THE CHAIR

DR. MORRIS A. GOLDBERGER reported a case of **Retention of Urine Due to Postpartum Parametritis.**

Mrs. R. S., age twenty-four, was admitted to Mount Sinai Hospital, on Nov. 21, 1923. Chief complaint retention of urine following childbirth eight weeks previously, fever and chills for two weeks. Never seriously ill or operated upon. During her pregnancy there was some urinary frequency. She had one spontaneous miscarriage at three months, 1½ years ago.

Menstrual history normal up to her recent pregnancy which was terminated by an instrumental delivery. Her bowels were always constipated. Since delivery she had to be catheterized daily. At times she has had involuntary dribbling of urine. For two weeks before admission to Mount Sinai Hospital she had an irregular temperature and chills and in the last twenty-four hours vomited all solid food. Physical examination showed a well-developed woman, with flushed cheeks, feverish and rather acutely ill. The teeth were in poor condition, tongue coated and moist. The tonsils were large and red, and the pharynx was congested. The neck showed a slight fullness in the thyroid area. The abdomen showed a separation of the recti muscles, was soft and relaxed. Slight tenderness could be elicited in both lumbar regions on percussion. There was no enlargement of the liver or spleen. The kidneys were not palpable. The lower abdomen showed the usual evidences of a recent pregnancy. Forty-eight ounces of urine were obtained by catheter. The vagina was relaxed. The cervix pointed forward. The uterus was slightly enlarged, retroflexed and limited in mobility. The adnexa were palpable. In the anterior precervical connective tissue there was a dense infiltration about 3 cm. in diameter that extended across in the anterior precervical space. The blood counts showed a leucocytosis of about 21,000 with a low poly count. The blood culture on November 25 was sterile and the Wassermann was negative. The urine showed 2+ albumin and contained many white blood cells in clumps.

Cystoscopy (11/27/23) showed the bladder to be intensely inflamed and covered with exudate. Both ureters were catheterized and practically clear urine obtained. Weak i. c. excretion from both kidneys. There was a bladder residual of 30 ounces+. Aspiration of the exudate *via* the anterior vaginal wall was negative. Microscopic examination of the ureteral specimens showed both sides to contain many white blood cells. The urea on both sides was 1.1 per cent. The P.S.P. was 23

per cent in two hours. An x-ray examination of the genitourinary tract showed both kidneys to be enlarged, normal in contour and no evidence of calculi.

A permanent catheter was introduced, the temperature gradually came down from 105° to 99° in 10 days and on the 19th day the catheter was removed. The temperature only rose to 101.8° on the 23rd day, after the patient was up. She was catheterized every six hours the residual being about 8 ounces and on discharge only 4 ounces. The exudate in the anterior parametrium on discharge practically disappeared and the patient was referred to the out-patient department of the hospital for further treatment. She was last seen in the out-patient department on January 23 and still had a residual of 3 ounces.

The cause of the retention of urine in this case was probably due to the exudate that was present in the precervical connective tissue. Its mechanism may be explained in several ways. Von Rosthorn's explanation is that of fixation of a portion of the posterior bladder wall as a result of the inflammatory infiltration, thus preventing the bladder wall from contracting completely,—hence retention. He also states that if the exudate is very hard it may cause retention by pressure, producing an obstruction. The latter view I think would necessitate a much larger exudate than was present in this case. Another explanation for this retention is based on the physiology and anatomy of the urinary bladder. The nerves of the bladder are derived from the pelvic plexus of the sympathetic and from the 3rd and 4th sacral nerves, the former supplying the upper part of the organ and the later the base and neck. Fibers passing by way of the nervi erigentes when stimulated cause contraction of the bladder and inhibition of the sphincter. The fibers supplied by the hypogastric plexus cause relaxation of the bladder muscle and tonic contraction of the internal sphincter. The nervus erigentes innervates the bladder near its neck, whereas the sympathetics do so higher up on the posterior surface at about the level of the precervical space. In this case the exudate was situated in this region and possibly involved the sympathetic nerve supply, thereby causing the functional disturbance described. While I have no positive evidence that this occurred in the case reported, yet the anatomical relationships as obtained from standard texts on anatomy and the physiology of the bladder are in favor of this explanation.

The cystitis present on admission to the hospital was probably due to infection as a result of frequent catheterizations, and not to an interstitial cystitis. The latter produces a contracted bladder of small capacity that bleeds easily. The temperature was most likely augmented by an associated pyelonephritis as a result of retention and possible ascending infection.

Dr. William P. Healy described a case of **Incarcerated Pregnant Retroflexed Uterus Due to an Ectopic Kidney.**

R. H., seen in consultation Nov. 17, 1922, age thirty, married seventeen months, no children, no miscarriages, general health excellent, appendectomy four years ago, no complications, menstruation every four weeks, three to five days' duration, moderate in quantity, no pain, last period July 22.

Present Illness.—Patient is in fourth month of pregnancy, and has been very well until two weeks ago, when she began to have difficulty in voiding urine, and for past three days has had to be catheterized. Although the patient was catheterized every eight hours, two to three pints of urine were obtained each time. For the past three days, she has had a great deal of suprapubic pain and distress. Bowels constipated, no chills or fever.

Examination.—Rather pale, but well-nourished woman of average height, heart and lungs normal, abdomen markedly distended below the umbilicus by a smooth cystic tumor, which on catheterization, proved to be a distended bladder containing

three pints of turbid urine, no fetal heart could be heard, nor could any fetus be palpated. Vaginal examination showed a bulging cystic tumor filled the culdesac, and pushed it down almost to the vaginal orifice, compressing the posterior vaginal wall against the rectum. The cervix was displaced so high in the vagina that it could not be reached by the examining finger. The entire pelvis was choked by this tumor and the uterus could not be outlined.

A tentative diagnosis was made of intraligamentous ovarian cyst, complicating pregnancy, and it was assumed that the rapid growth of the cyst had displaced the uterus to the front and interfered with micturition.

An abdominal operation for the relief of the condition was advised.

Patient was admitted to the Roosevelt Hospital, and the vaginal examination under an anesthetic revealed instead of the intraligamentous ovarian cyst, a retroflexed incarcerated pregnant uterus, which was impossible to replace. A median suprapubic abdominal incision was therefore made, and on exposing the pelvis, a somewhat crescent-shaped cystic tumor, the size of a small grapefruit, was revealed, just below the promontory of the sacrum and behind the peritoneum. This was identified as a displaced left kidney, the right kidney was normal in size and position. The uterus was sharply retroflexed and firmly incarcerated in the pelvis, and was released with considerable difficulty, and brought into its proper position.

As patient desired that every effort be made to save the pregnancy, no further operative procedure was undertaken at this time. The abdominal wound was closed, and patient returned to bed in good condition.

Patient aborted within twenty-four hours, a four-months' fetus with placenta and made a normal convalescence from both the operation and abortion.

At the time of the operation, the urinary bladder was so enlarged that it reached within one inch of the umbilicus when empty, and its walls were markedly hypertrophied, showing a huge mass in the lower abdominal zone.

During patient's convalescence, the bladder gradually returned to normal in size and the cystitis which was very marked before the operation gradually cleared up. During the first two weeks, there was a good deal of dysuria and inability to void. She was discharged from the hospital December 23, and the pelvic examination revealed a retroversion of the uterus and the ectopic kidney was readily palpable just below the promontory of the sacrum. Patient was advised to return to the hospital for nephrectomy and suspension of the uterus.

Jan. 4, 1923: Cystoscopic examination disclosed good bladder tolerance and capacity, and the mucosa, trigone and ureteral orifices normal in appearance. The right orifice was observed discharging urine into the bladder at regular and frequent intervals. No motion observed at left orifice. Catheters pass to either renal pelvis readily. No obstructions noted. No residual urine in right pelvis. Urine is clear in gross appearance. Phloridzin test strongly positive in twenty minutes. One ounce of residual urine obtained from left renal pelvis by aspiration. After this, the flow of urine was very slow and irregular. Urine is clear in gross appearance. Phloridzin test shows a very faint reaction after thirty minutes. Cultures of urine from each side remain sterile at the end of forty-eight hours. Pyelogram shows left ureter curves to right beyond the midline, then back toward left entering the pelvis from above. The pelvis is dilated and distorted, lies across the upper portion of the sacrum and the junction with the ureter is at the upper aspect of the pelvis. The calices are enlarged and distorted. There is probably very little kidney secreting tissue left.

Jan. 6, 1923: Phthalein intravenously injected appeared in the urine in five minutes. The urine had been rendered alkalin by the use of sodium bicarbonate, and the right side was observed secreting a deeply red-stained urine into the bladder at regular and frequent intervals, the stream being of good size and force. Nothing

observed coming from the left ureteral orifice at any time during the examination. Pyelogram of the right kidney shows normal position, but some dilatation of the pelvis and ureter.

Jan. 15, 1923: Through a midline suprapubic abdominal incision, the displaced left kidney was exposed, the posterior layer of the peritoneum incised, and the kidney removed. The kidney measured 7½ × 3½ × 2½ cm. The pelvis was dilated and somewhat larger in size than the kidney. The abdominal incision was closed and the retroperitoneal area was drained through a posterior colpotomy incision. On section, the cortex of the kidney was diminished and pale, medulla sacculated. Patient made a normal convalescence.

Patient again conceived in July, 1923, and up to the present time (February, 1924), pregnancy has progressed normally.

Dr. Healy also reported two cases of **Myosarcoma Complicating Adenocarcinoma of the Corpus Uteri.**

In the two cases herewith discussed, we have myosarcoma apparently arising in a fibromyoma and in each instance associated with adenoma destruens (adenocarcinoma) of the corporeal endometrium.

It seemed worth while to report these two cases of myosarcoma because of the multiple malignancy in each case and because sarcoma of the uterus is an infrequent disease; in fact, while the statistics of different investigators vary somewhat, very few of them suggest a ratio greater than 1 to 2 per cent.

In a study of 1479 cases of fibromyoma uteri operated upon at the Roosevelt Hospital from 1910 to 1922, only two cases of sarcoma were found, and Le Roy Broun reported a review of fifteen hundred cases of fibromyoma of the uterus, from the Woman's Hospital, showing but seven cases of sarcoma. The majority of the cases seem to occur during the fourth and fifth decades of life.

Microscopically, the tumor may be of round, spindle, or mixed cell type. Those that arise from fibroids are usually encapsulated to a large extent, whereas those that arise from uterine musculature are bound to be more diffuse. Symptomatically, it is difficult to recognize sarcoma of the uterus, for the symptoms are identical with those of carcinoma of the uterine body, or necrosis of a submucous fibroid, the chief symptoms being irregular, profuse bleeding, with a semipurulent discharge from the uterus, and very often a condition of pyometra is found.

1. E. S., age forty-seven, married, no children, no miscarriages. Menstruation began at sixteen, recurred every twenty-eight days, lasting three to five days, amount moderate. Menopause since 1921. Admitted to the Memorial Hospital, January, 1924.

Present Illness.—Since menopause, patient has occasionally noticed slight spotting of blood from the vagina. Three months ago, she began to have lower abdominal discomfort, and also a persistent, white vaginal discharge.

The uterus was curetted at this time, but after a short interval, pain and discharge started again. The tissue obtained at the operation was said to show no evidence of malignancy. The external genitals and the vagina were normal, cervix was thinned out, external os was about two cm. in diameter, and the cervical canal filled by a polypoid tumor, the lower pole of which blocked the external os. The uterus was about the size of a three months' gestation, rather soft and cystic in feel. The tubes and ovaries seemed normal and there was no evidence of infiltration in the parametria. On pushing the polypus up into the cervical canal, away from the external os, a large amount of grayish, chocolate-colored thick fluid with very little odor poured from the uterine canal.

A clinical diagnosis was made of pyometra, secondary to fibromyoma and possibly complicated by adenocarcinoma of the corporeal endometrium. Because of the pyometra, the polypoid nature of the tumor in the uterine canal, and the possibility of a cancer of the body of the uterus being present, all three of which conditions, we feel, are best treated surgically rather than by irradiation, a complete abdominal hysterectomy was the method of treatment advised and carried out.

Examination of gross specimen was as follows: The uterus is much enlarged, 14 cm. long by 8 by 6 cm., by a polypoid tumor which is irregularly lobulated, very opaque, well circumscribed, arising by a buried base from the myometrium. The surface is eroded and infiltrated by blood. The endometrial mucosa is eroded, the muscle of the uterus is moderately hypertrophied, the gross appearance is that of primary myosarcoma. Above the internal os, the entire endometrium is slightly thickened, roughened and superficially eroded.

Because of this report, the patient's entire pelvic field was irradiated three weeks after the operation with low voltage x-ray machine, and the tissues in the vicinity of the vaginal vault and base of the broad ligaments irradiated with the radium bomb per vaginam for 3000 millicurie hours.

C. H., age fifty-three, single, nulliparous. This patient was admitted to the Memorial Hospital February, 1918, with a history of menorrhagia and metrorrhagia, for which a curettage had been done, and a diagnosis of adenocarcinoma made on the curettings. Because of this diagnosis, the patient was referred to the Memorial Hospital for irradiation. The pelvic examination revealed an irregularly enlarged uterus about the size of a two and one-half or three months' gestation, with a normal cervix. A diagnosis of fibromyoma, complicated by adenocarcinoma of the corpus uteri, was made, and as the patient did not seem to be in very good physical condition, she was thin and anemic, it was decided that she should be treated by irradiation rather than by hysterectomy. Her treatment consisted of fifteen hundred mc. hours within the uterine canal above the internal os, filtered with six-tenths mm. of silver and a radium block applied in six positions externally about the pelvic girdle, for sixteen thousand mc. hours at a distance of four cm. with one-half mm. silver and two mm. lead filtration. There was no further bleeding from the uterus after this treatment, and in April, two months after the treatment, the uterus was said to be about the size of a two months' gestation.

Patient continued to be apparently well and symptom free from that time 1918, until Dec. 19, 1923, nearly six years later. She now complains of a feeling of fullness and discomfort in the lower abdomen. Examination revealed a uterus symmetrically enlarged to about the size of a four and one-half months' gestation, soft and cystic in feel and the cervix very small and hard. A diagnosis of pyometra was made and patient was advised to have a hysterectomy, which was done January 25, 1924.

On bisection of the uterus, after its removal, there was found a large pedunculated solid tumor of soft consistence, the lower two-thirds of which was necrotic and reddish-purple in color, the base yellowish-white, and uniform in appearance on its cut surface. Histologic examination revealed myosarcoma. In this case also, the operative procedure will be followed up by complete irradiation of the pelvic field with x-ray and radium.

DISCUSSION

DR. DOUGAL BISSELL.—It has fallen to my lot to see an unusual number of misplaced kidneys during my surgical career. I use the word misplaced instead of ectopic because the latter word means simply a kidney out of position, either acquired or congenital, whereas the former means a kidney congenitally out of position. I assume from Dr. Healy's description of the case that it is a misplaced kidney and not a displaced kidney.

My interest in misplaced kidneys began in 1908 when there came under my care a patient sent by the late Dr. Wm. T. Bull. He considered her condition to be one of pregnancy, seven months or more, complicated by a fibroid tumor resting in the posterior culdesac. Under anesthesia each surgeon unhesitatingly diagnosed the pelvic tumor as a kidney reaching the lowest point in Douglas' culdesac; its outlines were so distinct then that it was impossible to mistake it for anything else. As this kidney presented a formidable obstacle to the delivery of the child, it was determined to empty the uterus. The problem then was how to manage the kidney. After considering the matter carefully, I determined that if the kidney could be released and the ureter and blood vessels found long enough, an attempt would be made to fix the organ. This was accomplished with success and a report of the surgical technic adopted then can be found in the Transactions of the American Gynecological Society, 1911, in connection with the history of two other cases. The third case I replaced was in some respects like that reported by Dr. Healy tonight. In Dr. Healy's case, however, the kidney was single, in mine it was double; in his case the kidney was placed immediately below the brim of the pelvis in the upper sacral region and as far as was known did not become a disturbing factor until after pregnancy; it occupied originally a comparatively small part of the true pelvis in a protected position and had a ureter very long. In my case the kidney occupied nearly two-thirds of the true pelvis anteroposteriorly, extended beyond the middle line, projected far above the brim of the pelvis and could be distinctly felt through the abdominal wall as a large tumor mass. Because of the presence of this large mass, the uterus was never able to assume an upright position, the only congenitally retroposed uterus I have met with. The uterus in Dr. Healy's case may have been retroposed when pregnancy occurred, but it was not incarcerated until its body had developed to a considerable size. Therefore if the retroposed pregnant uterus had been recognized early and corrected by manipulation or surgery, the pregnancy might have continued to full term and the injury to the kidney as the result of an incarcerated pregnant uterus could have been avoided. In my case the kidney mass, after severing the vessels passing to its lower half, or what should have been the left kidney, was lifted out of the true pelvis. The sacrifice of these vessels was necessary. As the result of the severing of these vessels, the lower half of which empties into the left ureter, ceased to function for several months but eventually did function. The patient married within the year after operation and passed through two successful unassisted labors within three years.

These three cases of misplaced kidneys are the only reported successful replacements of this type of congenital deformity which is evidence of the fact that the condition has been given scant attention from a conservative surgical standpoint. Many a woman has lost her life or sacrificed her kidney or undergone unnecessary surgical procedure because of the failure on the part of the surgeon to recognize this pathology. I am of the opinion that a large number of these pelvic kidneys can be saved if the surgeon will only bear in mind the possibility of their existence. Finally the diagnosis may be difficult or may be easy if one suspects the presence of a misplaced kidney. The x-ray will solve the problem.

DR. BARTON COOKE HIRST, PHILADELPHIA.—I have seen only one case of ectopic kidney. It never occurred to me that these kidneys could be so well replaced as Dr. Bissel has shown to be possible.

DR. HEALY (closing).—At the time of the first operation we did not know the function of the other kidney, and we did not remove the kidney at that time because we thought it perfectly safe to postpone this procedure until the patient had convalesced from the operation. After study of the functional capacity of both

kidneys, and finding that the ectopic kidney was functionally useless, we determined to remove it, even though it had a free ureter which would have made it possible to replace the kidney in normal position.

DR. JAMES TAYLOE GWATHMEY read a paper entitled **Painless Childbirth by Synergistic Methods**. (For original article see page 154.)

DISCUSSION

DR. BARTON COOKE HIRST.—I tried twilight sleep when it first came out in 1903, but had to give it up as there were too many cases of postpartum hemorrhage and too many asphyxiated babies. I took it up again as modified by Krönig and Gauss with more moderate doses of morphia and scopolamine, with the larger element in their method of suggestion. The patient, you know, is secluded; her ears are stuffed with cotton; the room is darkened and the obstetrician comments on what a wonderful thing twilight sleep is and how it relieves the patient of all pain. I visited Gauss and watched his method in operation. On one occasion I had two patients in adjoining rooms, one a hard-headed college woman and the other a woman of the mild, submissive type. It was interesting to watch the reaction of suggestion on both. The first said when I made the usual remark that "this is twilight sleep; a wonderful thing; she feels absolutely no pain": "It is not true. I am suffering intensely." The other woman looked surprised, startled and seemed to be suffering severely, but evidently thought the doctor knew better and she accepted the suggestion. After the labors were over, following the Gauss plan I repeated each day to these patients that twilight sleep was a wonderful thing and that they had passed through labor without suffering any pain. They both left the hospital convinced that they had suffered no pain. I use morphine and scopolamine still, but not routinely. I tried rectal administration of oil and ether some years ago but discontinued it. Later I thought that I had made a great discovery. Cannabis indica seemed to be the ideal drug for the control of labor pains; its first effect is to produce hilarity; the patient bursts out in a loud laugh and loses all sense of time and space, but it was a failure.

When I heard of Dr. Gwathmey's work I was much interested because his method promised to be practicable for the general practitioner. It is something that any doctor anywhere can employ. I think Dr. Gwathmey is on the right track. I shall adopt this system and try it out, for all new methods must be subjected to collective investigation to determine their true value.

DR. AUSTIN FLINT.—We all wish that we could efface the recollection of a painful childbirth and so care for the patient that she will approach another labor without great fear. The most satisfactory anesthesia that we have had so far for use in obstetrics has been a combination of gas and oxygen, supplemented with ether or chloroform while the child is actually being born. The method which Dr. Gwathmey has described appeals to common sense. It is a simple and rational method of diminishing pain, and the statistical reports show that the results are good in the majority of cases. The only thing that is needed is a possible modification. The attitude we should take is to extend to Dr. Gwathmey a helping hand by employing the method ourselves or by allowing Dr. Gwathmey to do it for us, or by using the procedure under his supervision. I should like to see it used in the hospitals with which I am connected. Any one who has listened to Dr. Gwathmey's presentation must feel that this form of synergistic anesthesia is sensible and practical. Its chief advantage is its simplicity. If we can have a simple routine consisting of giving 2 or 3 hypodermics, and then a colon injection, using drugs that can be purchased at the drug store, and can feel assured that the patient will have a painless time, the method will prove a boon to obstetrics.

DR. SAMUEL J. DRUSKIN.—I have used the method in fifty surgical and gynecological cases and in these it has worked excellently. There was no vomiting, pain or distention. Of six patients in whom cesarean section was performed two had bronchopneumonia; they had received ether from inexperienced internes. Since 1922, I have been trying the synergistic method in childbirth, and I have made use of various sorts of formulas. I have used 5 c.c. of a 25 per cent solution of magnesium sulphate. The method we now use is as follows: We give 1/6 grain of morphine by hypodermic when the cervix is two fingers dilated; then scopolamine, 1/200 of a grain with it and repeat this four or five times after a period of one-half to three-quarters of an hour. At the end of the fifth dose we give 150 c.c. of a 10 per cent solution of magnesium sulphate by hypodermoclysis. There are several things that we have noted, the most striking of which is the rapid dilatation of the cervix. Among the by-effects we see a slight edema of the face, the tissues seem to be more succulent and the capillary blood supply is greater than in cases that have not received the treatment. We have not completed our work as yet, but up to the present time this is the most recent formula that we have used. We have not used ether by colonic irrigation. I should like to ask Dr. Gwathmey why he does not increase the amount of magnesium sulphate he is using, because in our cases magnesium sulphate has not been deleterious.

DR. GWATHMEY (closing).—A system was adopted by which we finally arrived at the minimum dosage that gives the maximum results. Dr. Davis was not anxious to have us try any method in which there was an element of danger, and if we had introduced something that had given bad results that would have put an end to the experiments long ago. At first we selected our cases very carefully, taking those that would apparently go through labor normally. We begin by giving one hypodermic and then giving the instillation at a variable period of time, depending upon the effect. We gave two hypodermics of magnesium sulphate to a woman who had a contracted pelvis and then it was found that she had to be delivered. However, the medicine did its work, and she was relieved of pain. The question comes up when to withhold these drugs. The fact that a woman has a contracted pelvis and has to be delivered is no argument against the medicine. Why not use magnesium sulphate in obstetrics when it has proved itself useful in surgical anesthesia? At the Presbyterian Hospital they have used 3/8 of a grain of morphine and 400 c.c. of a 4 per cent solution with no untoward results on over 200 cases; the patient comes to the table relaxed and ready for surgical operation; this medication is then supplemented with nitrous oxid-oxygen. The procedure just mentioned was painful and also required the attendance of a physician, although there were no accidents or sloughing. A surgeon in another part of the country who had tried this method modified it by giving 1/8 of a grain of morphine in 2 c.c. of a 25 per cent solution and repeating twice, i.e., each patient gets 3/8 of a grain of morphine and 6 c.c. of a 25 per cent solution of magnesium sulphate. He claims that this technic gives the same results as the 400 c.c. of 4 per cent solution of magnesium sulphate plus 3/8 grain of morphine. If we get these results in surgical cases why should we not use this method in obstetrical cases? In developing this method I have in mind a man in the country who may not have an assistant or even a trained nurse. He can give this instillation and the three hypodermics and relieve pain. When ether is given by colon it does not have the effect that it does when given by inhalation. It does not cause nausea and gas distention. In a hospital in Huntington, West Virginia, oil-ether colonic injections have been given in over 2,000 cases. The surgeon operating there states that the reason he uses it instead of ether inhalation is because it does not produce shock as does ether when inhaled. The colonic instillation also produces analgesia almost twice as quickly as when inhalation is used. In painless childbirth one-half the amount

is used that is given by colon for surgical anesthesia. We have tried the method in enough cases to be convinced that there is practically no danger. In giving the colonic instillation air-bubbles must be excluded and one must always be sure that the lower bowel is clean. It may be that we have already arrived at the point where this method is as efficient as we can make it. We obtain analgesia and also amnesia.

I object to cannabis indica because one cannot rely upon the drug. Cannabis indica is as harmless a substance as we can add, but it is difficult to standardize, and one cannot rely upon its effects.

If anyone wants to try this method it is best to get someone who is acquainted with the technic to demonstrate it. We now have the method standardized to the extent that we secure 85 per cent success.

Department of Reviews and Abstracts

Conducted by Hugo Ehrenfest, M.D., Associate Editor

Selected Abstracts

Extrauterine Pregnancy and Intraabdominal Hemorrhages

Lohnberg: Clinical Features of Ectopic Pregnancy. Zeitschrift für Geburtshülfe und Gynäkologie, 1921, lxxxiv, 404.

The author reviews 152 cases of extrauterine pregnancy operated in the Köln Clinic. The average age of the patients was 31.2 years. Twenty-four had never previously been pregnant; of these 10 were unmarried girls, 14 married women; 34 had had one previous pregnancy. The high percentage of nulliparae and primiparae speaks for the inflammatory and usually gonorrheal nature of the causation, which would lead in the more severe cases to complete or one-child sterility. An average period of sterility of 4.7 years preceded the ectopic pregnancy. Of the cases 67 were tubal ruptures, 81 tubal abortions and 4 growing, uninterrupted pregnancies. The author calls attention to the importance of the anamnesis, especially in regard to bleeding and pain, in the diagnosis, though frequently inflammatory adnexal disease may give exactly the same history. Bleeding appeared after an amenorrhea up to 3 months in 101 cases, the menses did not cease in 27 cases, intermenstrual bleeding occurred in 24 cases, there was no uterine bleeding in 16. In these latter, urgent symptoms due to rupture demanded operative interference before external bleeding, the sign of disintegration of the uterine decidua, could occur. These cases bled after operation. Pain resembled labor pains in many cases. It appeared before the bleeding in 31 cases, later in 17, simultaneously in 37. The location of the pain and the site of the pregnancy coincided in 89.5 per cent of the cases. The two sides were involved almost equally frequently. A clinical sign of some importance in the case of tubal abortion with hematocele is the appearance of a slight hemolytic icterus.

Repeated ectopic pregnancies were represented by 8 or 5.26 per cent of the cases, in 4 the other tube was macroscopically normal at the first operation. Of 67 laparotomies for tubal rupture, five cases died of hemorrhage, one died from an early eclampsia associated with the tubal pregnancy. Of 59 laparotomies for tubal abortion, none died; of 22 elytrotomies for tubal abortion, one died of peritonitis in spite of the evacuation of an infected hematocele. The author believes that so long as there is yet a spark of life immediate laparotomy should be performed in all cases of ruptured ectopic pregnancy. It is unsafe to wait for shock to subside. The reinfusion of the extravasated blood, after defibrination and careful filtration through gauze was performed in 14 cases. The author believes it is of the greatest value and in no case were there any untoward effects.

The later outcome is known in only 41 of these cases. Of these, 10 from the nature of their operation could no longer become pregnant. Of the remaining 31, 12 had later had intrauterine pregnancies or 38.7 per cent.

In this series of 31, only two had a second tubal pregnancy, that is the chances for a normal intrauterine pregnancy are about six times as great as for a repeated extrauterine. These results therefore justify conservatism in the treatment of the opposite apparently normal tube. MARGARET SCHULZE.

Eerland: Extrauterine Pregnancy. Nederlandsch Tijdschrift voor Geneeskunde, 1924, i, 326.

The basis of this very detailed analysis are 116 cases. Of these 18 were treated conservatively, while 98 were operated, 92 by laparotomy and 6 by colpotomy. The fatal cases had all been subjected to laparotomy.

These were all received in a desperate condition and immediately subjected to laparotomy. In three of these cases abortion had been attempted and probably also in a fourth case, however peritonitis was the cause of death in only one of these. An attempt at abortion had been made in at least 7 other cases. Four of the fatal cases were *in extremis* when operated and in two of these the bleeding was still active at the time of operation. Active bleeding was encountered in 12 per cent of all operated cases. One patient died 5 days after operation (peritonitis).

Of the conservatively treated cases the diagnosis was considered certain in 10, almost certain in 6, and probable in the rest. Since exploratory puncture was abandoned some years ago, conservative treatment also has become less frequent.

Of 58 women in whom further pregnancy was possible, 30 later became pregnant one or more times (14 abortions and 35 live children). In addition, 5 had a subsequent ectopic gestation. R. E. WOBUS.

Engelmann, F.: The Necessity and Results of Early Operation in Tubal Pregnancy. Medizinische Klinik, 1923, xix, 535.

During the past year at the Dortmund Frauenklinik, three times as many women as formerly were operated upon for extrauterine pregnancy. This the author attributes to the increase in pelvic infections, and the latter are due not so much to gonorrhea as to criminally induced or improperly handled abortions.

The afebrile patients stayed in the hospital on an average of 14 days while the febrile ones remained 30 days. Furthermore the latter were semi-invalids for a variable length of time afterwards. The author emphasizes that the fate of women with tubal pregnancy is dependent upon an early diagnosis and early operation. If one waits too long fever develops. Of late in the mildly febrile cases, the author has waited until the temperature subsided and then operated with success. J. P. GREENHILL.

Hellendall, H.: Important Questions Regarding Tubal Pregnancy. Medizinische Klinik, 1923, xix, 311 and 341.

In the literature up to the present time there have been only fourteen reports of attempted abortion in cases of extrauterine pregnancy. Hellendall reports the fifteenth case. Of the fifteen cases, eleven were cured by laparotomy. The others died of peritonitis. Since this mortality is much higher than occurs when abortion is attempted in intrauterine pregnancy, the former cases must be very susceptible to serious infection. It is important in these cases to operate early.

The association of attempts at abortion and ectopic pregnancy is more frequent than is supposed. The occurrence of fever after operation for tubal pregnancy may in some cases be due to previous attempts to produce abortion.

In the second part of the article, Hellendall considers the matter of doing curettements in the presence of extrauterine pregnancy. In twelve cases, the curettements were done both for therapeutic and diagnostic purposes. In six cases, the physicians thought they were dealing with ordinary abortions and in two cases, carcinoma was suspected. In nine of the twelve cases, the curettement had no effect on the subsequent course of the tubal pregnancy. It is seen therefore that a careful curettement under the strictest aseptic precautions may be undertaken without harm for diagnostic purposes. However preparations for laparotomy must be made beforehand since the slightest pressure may at times cause severe hemorrhage.

In a number of cases, no decidua was found in the uterine scrapings. The absence of decidual cells in uterine scrapings does not therefore speak against an extrauterine pregnancy. The chief value of a diagnostic curettement lies in the discovery of placental elements in the uterus. This means an intrauterine pregnancy and will save the patient an unnecessary operation.

J. P. GREENHILL.

Dossena, G.: Conservatism in Surgical Treatment of Tubal Pregnancy. Annali di Ostetricia e Ginecologia, 1922, xlv, 407.

Usually the pregnant tube is removed, and not infrequently the non-pregnant tube as well. The author agrees that in cases of tubal rupture the tube should always be excised; on the other hand, if the pregnant tube is intact, as it often is in the condition of tubal abortion, it should not be removed, provided the corresponding ovary is in good condition, that the tubal lumen is patent, and that there are not marked peritubal changes such as old adhesions, kinks, etc.

He reports 11 such cases operated on in Mangiagalli's clinic since 1910. In all cases tubal abortion was found, the tube either already emptied of the ovum, or else gently dilated and pressed upon to complete a partial emptying. In no case was the tube removed. In the last case of the series it was impossible to say from which side the abortion had come. There were no deaths in this series.

Inasmuch as all of these cases improved immediately after operation it is evident that no bleeding follows a complete emptying of an intact tube. The question of recurrence in the same tube of an ectopic pregnancy should be answered more from the point of lesions of the serosa of the tube, e. g., kinks, adhesions, etc., than from the possibility of inflammations of the endosalpinx. The possibility of future malignant neoplastic changes in the affected tube is a purely theoretical one.

The treatment of tubal pregnancy should be, therefore, conservative rather than destructive whenever possible. THOS. R. GOETHALS.

Whitehouse: Salpingotomy Versus Salpingectomy in the Treatment of Tubal Gestation. Journal of Obstetrics and Gynæcology of the British Empire, 1922, xxix, p. 93.

The author concludes from dissection of fresh specimens of tubal mole that in each instance the ovum had been attached by a narrow pedicle to the floor of the proximal end of the tube. Remains of tubal mucosa were found extending several millimeters up along the pedicle in the majority of cases. The peristaltic action of the wall in tubal abortion tears through this pedicle. The deciding factor between intra- and extra-tubal rupture in any given case is a combination of tissue erosion and tension. Evidence of previous tubal infection was the exception in these cases. Rupture of a gestation situated on the supported floor of the tube usually extends into the lumen. Extra-tubal rupture is the rule in

pregnancy of the isthmic portion of the tube. Salpingectomy is the surgical treatment for these cases. In tubal mole or abortion, the author believes salpingotomy (in the absence of severe hemorrhage) has a place. H. W. SHUTTER.

Hawks: Immediate Versus Delayed Operation in Cases of Collapse Following Ruptured Ectopic Pregnancy. Surgery, Gynecology and Obstetrics, 1923, xxxvi, 232.

Hawks believes that even in case of collapse the patient has a decidedly better chance if operated on at once. In 134 cases operated during collapse there was a death rate of about 10 per cent, while of 71 cases not operated on, the mortality was 17 per cent. He believes that many a seemingly hopeless case may be made operable by giving a blood transfusion immediately before operation, and further blood transfusion or glucose solution, as indicated, immediately after the vessels are tied.

In an analysis of cases with fatal termination in which autopsy was performed, it is interesting to note that about as many died from rupture of the middle third of the tube as from rupture at or near the cornu, and that some died from rupture at the outer third. R. E. WOBUS.

Broun, LeRoy: Menstrual Disturbance and Pain in Tubal Pregnancy. Medical Record, 1921, c, 839.

In a series of 55 patients 16 gave the classical history of having missed a period and later having irregular bleeding; 17 commenced the irregular uterine flow at the time of the expected normal period; and 16 continued with an irregular flow within a few days after the occurrence of the normal period. With reference to pain, the author found 22 cases in the series where the escape of free blood into the general peritoneal cavity caused intense recurrent pain in the abdomen, while escaped encapsulated blood in the pelvis in 20 cases caused pain of a different character varying in degree from instances of mild discomfort to that of much pelvic distress. In another class (7 cases) the only pain symptom was that of discomfort on the side involved in patients who were operated on before rupture or escape of blood had occurred. Another class (4 cases) had almost constant symptomatic uterine flow with discomfort of varying degree on one side and revealed at operation an encapsulated tubal hematocele with a closed fimbriated extremity of the tube. On account of the immediate and changing pathological conditions present, there can be no constant symptoms existing in all cases. Uterine flowing is probably the most constant of all symptoms of tubal gestation. Even this is absent, however, in some of the most serious cases in which the erosive action of the villi has been sufficient so to weaken the tube wall as to permit of a rupture and profuse abdominal hemorrhage, the first symptom to call the patient's attention to her serious condition.
C. O. MALAND.

Laffont, Amédée: Delayed "High" Pain in Extrauterine Pregnancy. A New Sign of Tubal Rupture. La Presse Médicale, 1924, No. 16, p. 167.

The author has noticed that in many cases of tubal rupture the patients complain of thoracic, interscapular, intercostal, or epigastric pain. This "high pain" is usually associated with an extended peritoneal inundation, in which the effused blood is not confined to the true pelvis; very infrequently is it noted in connection with encysted unilateral hematoceles. It is not a constant phenomenon, and nearly always follows the local pelvic pain of tubal rupture, the interval varying

from a few hours to two or three weeks; the average is two or three hours. It appears to be due to distension of the cul-de-sac of Douglas and to irritation of the peritoneum of the general cavity by the effused blood. A slight hemorrhage does not, as a rule, produce this symptom. Hence the "high pain" is an indication for immediate intervention. It is at times so severe and may develop so rapidly that thoracic or upper abdominal lesions are suspected, the pelvic symptoms being so slight as to be overlooked.

The mechanism of this phenomenon is in doubt, but it is evidently a reflex through the sympathetic system. E. L. KING.

Novak: The Diagnosis of Tubal Pregnancy. American Journal of Medical Sciences, 1923, clxvi, 228.

An unusual classification is made in the non-tragic and tragic types, instead of the usual classification of unruptured and ruptured extrauterine pregnancy. Novak takes up the various symptoms and findings and lays special stress on the menstrual history, pelvic pain, the presence of a unilateral tender mass in the pelvis and the Cullen sign. He brings out that amenorrhea is not the usual thing in extrauterine pregnancy. Uterine bleeding is due to the death of the impregnated ovum which, because of its effect on the corpus luteum, had been inhibiting menstruation. He disclaims Polak's theory of ovular unrest. About 5 per cent of the cases are of the tragic type. WM. KERWIN.

Trancu-Rainer: The Decidual Reaction in the Tubes in Single or Bilateral Tubal Pregnancy During the First Three Months. Zeitschrift für Geburtshülfe und Gynäkologie, 1923, lxxxvi, 278.

The author describes four cases of tubal pregnancy in the fifth to twelfth week in which systematic study was made of both tubes for decidual reaction. In three of the cases, she found decidual reaction, in one case a slight, in the others extensive ones. In one case it was possible to make a direct comparison with the uterine decidua *in situ* and here it was possible to demontsrate a complete morphologic similarity between the two cell groups.

Of the six tubes of the three positive cases, four were pregnant. In all these the ovum was in the ampullary portion. Of the two non-pregnant tubes which were removed because of hematosalpinx, only one showed a decidual reaction, and this was in the mucosa, whereas the pregnant tubes showed also a decidual reaction on the serosa in three cases, and in the muscularis in one case. Evidences of inflammation were present in all cases, an important factor in the development of ectopic decidua in the estimation of Robert Meyer.

The author agrees with Unterberger that the capacity for development into decidua is not restricted to the stroma cells of the uterine mucosa but is a property of young actively growing connective tissue wherever located in the body. MARGARET SCHULZE.

Fink, K: Intratubal Degeneration of Tubal Pregnancies. Monatsschrift für Geburtshülfe und Gynäkologie, 1922, lviii, 166.

Degeneration of young ova in the fallopian tube may occur and be so free from symptoms that the patient does not consult a physician. On the other hand, it may produce such atypical symptoms that an accurate diagnosis is impossible. Hence many cases of ovular degeneration are found accidentally.

In animals, complete absorption of ova in the tubes has been demonstrated and in the human, Polano as well as Fränkel have observed the disappearance

of ova in the uterus itself. Even after the bony structure has formed, absorption may take place.

Fink reports two cases in which ova in the fallopian tube were absorbed. One patient was operated upon three months and the other 3-4 weeks after the degeneration had occurred, as evidenced by the history. The author believes these ova were absorbed because the portions of the tube toward the ampulla were normal, because of the absence of blood in the abdominal cavity and the intactness of the tubal wall. The absence of symptoms, which accompany tubal rupture or abortion, also points to intratubal absorption. In both of these cases there were dry hematomas. Opposed to these dry absorptions is a form of degeneration which is associated with a hemorrhagic process. In this a pathological change takes place in the tube and also a concomitant change in the opposite non-gravid tube which cannot be differentiated macroscopically from a hematosalpinx. Two cases are reported which show this condition.

J. P. GREENHILL.

Oliver, James: A Study of the Death of the Full Term Extrauterine Fetus in Situ. New York Medical Journal, 1923, cxviii, 81.

Every extrauterine fetus attaining maturity does so by virtue of an accessory blood supply attained by the structure in which it is lodged, adhesions with the omentum and occasionally with the bowel. Tubal pregnancies enduring longest draw their blood supply from the portion of the tube resting in the broad ligament. Structurally the only difference between the placenta of the uterine and extrauterine pregnancy is that the former is so situated as to be shed early after labor.

The human oosperm never devours the living formed cells of the mother in order to make a special chamber for itself. This being true, hemorrhage in early tubal pregnancy is not due to an erosive action of the trophoblast. The mature extrauterine fetus dies when the limit of duration of the functioning activity of the placental cells is reached. Death occurs without a struggle from paralysis due to lack of mineral substances and oxygen. Similar deaths in uterine pregnancies are a well known cause of stillbirths. Death is in no way due to lack of vigor of the maternal circulation supplying the placenta. This is shown by the uncontrollable hemorrhage met in trying to remove such a placenta. The extrauterine fetus has a well formed, normally developed body up to the time of its death.

H. W. SHUTTER.

Hicks, H. T.: A Case of Full Term Ectopic Gestation with a Living Fetus. British Medical Journal, Jan. 28, 1922, page 141.

In this case an erroneous diagnosis was made earlier in the pregnancy. She was allowed to go to term. The baby was delivered by abdominal section. There was a very serious hemorrhage. The baby was normal, but died about thirty hours after delivery. The patient recovered after a stormy convalescence. The author draws the following conclusions: (1) The diagnosis between an intrauterine pregnancy complicated with a tumor and an ectopic gestation at term is often very difficult. (2) If diagnosed, the question of saving fetal life should be neglected. The fetus will most likely be deformed, and the hemorrhage from the living ectopic placenta is extremely alarming. (3) The patient should therefore be allowed to go through the spurious labor (when the fetus dies), and the operation should take place about three weeks later, when the dangers of hemorrhage will be much lessened.

F. L. ADAIR.

Benzel: Repeated Tubal Pregnancy in the Same Patient. Deutsche Medizinische Wochenschrift, 1923, xlix, 687.

The author reports a case of right tubal pregnancy with rupture occurring in a nulliparous patient one year after marriage. He removed the damaged portion of the tube and turned the stump under the peritoneum. One and one-half years later he operated on her for a left tubal pregnancy undergoing abortion. This tube he removed by a wedge-shaped excision from the uterus. He believes that this method should be used if the condition of the patient permits, because he has seen tubal pregnancy occur in the stump of a resected tube.

F. A. PEMBERTON.

Sippel: Simultaneous Tubal and Intrauterine Pregnancy. Deutsche Medizinische Wochenschrift, 1922, xlviii, 1202.

Sippel operated on a healthy woman for right sided tubal abortion of two months. At operation he discovered not only an ovarian cyst, the size of a chicken egg, on the same side, but found that the uterus also was pregnant. He removed tube and ovary and her recovery was uneventful. Eight months later the woman was delivered of a well developed child.

The extirpated ovary contained no corpus luteum, so that both ova must have originated in the left ovary. The left adnexa were normal at the time of operation. Fourteen months after the birth of her child, the woman was again operated on for ruptured tubal pregnancy of 7 weeks' duration on the opposite side. The seat of nidation was in the isthmus. As at the previous operation, there were no adhesions or other evidence of inflammation. The ovary was left *in situ*.

Since both tubes in this case were apparently normal and, it may be presumed, the left tube transmitted the ovum which developed within the uterus, he brings up the question whether the cause of extrauterine pregnancy may not exist in the ovum itself rather than in the tube.

R. E. WOBUS.

Stropeni: Contribution to the Study of Simultaneous Uterine and Tubal Pregnancies. Annali di Ostetricia e Ginecologia, 1921, xliii, 837.

Neugebauer reported 170 cases of simultaneous intra- and extrauterine pregnancies from the literature on this subject up to 1907; in 1913 he was able to bring the total up to 243. The author has been able to collect only five or six more cases from the literature since 1913, reporting in detail a case from the Torino clinic.

In 110 of the cases reported by Neugebauer the uterine pregnancy ended in abortion, spontaneously in most cases, in some cases after surgical treatment of the ectopic pregnancy. In 38 of Neugebauer's cases in which the fate of the ectopic fetus is reported, the latter reached term in 6, while in 35 cases both ectopic and uterine pregnancies reached term.

Although Fenger states that operation on the tube in such cases is regularly followed in a few days by uterine abortion, Neugebauer's series show 73 in which the uterine pregnancy proceeded to term with a living child, despite previous operation for the ectopic in 35 of them.

The casé reported by the author is of a 37 year old woman in her second pregnancy, with a history of a pregnancy interrupted in the first month 8 years before, and with gonorrhea two years ago. She was operated on for intestinal obstruction 28 days after a tubal rupture in the second month, and the tube

removed. A month later a 5 month pregnancy was diagnosed, and 4 months later a full term hydrocephalic child was born, after a long labor, by craniotomy.

The author believes, in the light of this case, taken in conjunction with Neugebauer's series, that when it is necessary to intervene in a case of extrauterine pregnancy it is not necessary to consider the possibly coexisting uterine pregnancy, as the latter has a great probability of going on normally to term.

THOMAS R. GOETHALS.

Thorek: Unilateral Twin Tubal Pregnancy. New York Medical Journal, 1921, cxiv, 403.

The author briefly reviews the literature and gives illustrations and a report of his own case. The patient was a white woman of 29, who had had two children by normal labors. Her history and examination pointed to a ruptured ectopic gestation at four to five months. At operation, the left tube was found ruptured, with twin fetuses 6¼ inches in length, attached to a common placenta free in the abdominal cavity with much old blood. MARGARET SCHULZE.

Daniel: Interstitial Pregnancy. Surgery, Gynecology and Obstetrics, 1922, xxxiv, 15.

Daniel reports two cases of this condition and, in this connection takes up the subject of differential diagnosis. About the only symptom which is present with any degree of regularity, is delayed menstruation. In addition to this, there is, at times an expulsion of decidua, and always a varying asymmetry of the uterus. The adnexa, as well as the insertion of the round ligaments also show a variation, depending upon the asymmetry of the uterus itself. However, these symptoms are not constant or, if present, cannot always be detected, so that, as in his two cases, the diagnosis is usually made only after removal of the specimen.

R. E. WOBUS.

Woolf: Bilateral Interstitial Ruptured Ectopic Gestation Sacs. The Lancet, 1922, ccii, 11.

The author reports an unusual case of bilateral interstitial ruptured ectopic gestation sacs occurring in a married woman. A subtotal hysterectomy was done.

NORMAN F. MILLER.

Fuchs, H.: Ovarian Pregnancy in the Absence of the Corresponding Tube (External Migration of Spermatozoa). Monatsschrift für Geburtshülfe und Gynäkologie, 1923, lxiii, 61.

A patient was operated upon for ectopic pregnancy in February, 1922. The left tube containing the pregnancy was removed. Examination showed the corpus luteum of pregnancy to be in the right ovary and hence this was a case of external migration of the ovum.

A short time after this operation the patient again became pregnant and because of vaginal bleeding was examined thoroughly. In the midline was found what appeared to be a four months' pregnant uterus. Immediately after the examination the patient collapsed. A second examination revealed marked changes in the tumor previously felt. A laparotomy was performed and about 1 liter of blood was found in the abdominal cavity. The tumor from which the blood was flowing was found to be lying on the uterus, which was of normal size but pushed to the right side. The tumor was removed. At the site of the former salpingectomy there was a smooth peritoneal surface.

The tumor on microscopic examination proved to be an ovarian pregnancy in which the nidation had been intrafollicular. It was situated rather deeply in the ovarian tissue. In this case there had occurred an external migration of the spermatozoon. J. P. GREENHILL.

Hunter: A Case of Early Ovarian Pregnancy. The Medical Journal of Australia, 1921, ii, 233.

The case reported is one of very early ovarian pregnancy. The author believes that the specimen is approximately three weeks of age.

All requirements which must be fulfilled before a specimen may properly be designated an ovarian pregnancy were satisfied in this case. Several excellent photographs accompany the careful description of the specimen.

NORMAN F. MILLER.

Chalfant: Ovarian Pregnancy with Report of a Case. The Pennsylvania Medical Journal, 1921, xxiv, 548.

Spiegelberg in 1878 suggested certain criteria essential to the diagnosis of ovarian pregnancy: (1) the tube on the affected side must be intact, (2) the fetal sac must occupy the position of the ovary, (3) it must be connected to the uterus by the uteroovarian ligament and (4) definite ovarian tissue should be found in the sac wall. The case reported by Chalfant apparently conforms to all the Spiegelberg criteria.

The article includes several excellent microphotographs.

NORMAN F. MILLER.

McMillan and Dunn: Report of a Case of Abdominal Pregnancy Following Hysterectomy. Surgery, Gynecology and Obstetrics, 1921, xxxiii, 199.

Hysterectomy was performed on a young girl for double pyosalpinx. Since the right ovary and a portion of the right tube were found to be practically normal, they were sewed to the stump of the cervix. Eighteen months later the patient was brought back on account of a tumor in the abdomen. The patient looked and felt well, only complaining of "cramping and kicking in the abdomen." She was very indignant on being told she was pregnant, as she had been assured on leaving the hospital that she was sterile.

The patient had cramplike pains which increased in severity. Abdominal section revealed a dead baby, weighing 8½ pounds, enclosed in an intact amniotic sac. This was partly covered by clotted blood. The placenta was situated in the region of the spleen and was removed.

A year and a half later she had an attack of abdominal pain and signs of internal hemorrhage. She was again operated. The abdomen contained free blood and an amniotic sac, partly covered by the remnants of the tube, within it a 4-pound fetus. As the patient had been nearly exsanguinated, she succumbed shortly afterward. R. E. WOBUS.

Jacquin, P.: Primary Abdominal Pregnancy. Gynécologie et Obstétrique, 1922, v, 492.

Exact diagnosis of this condition requires careful macroscopic and microscopic examination to determine the actual relationship of the implantation to the genital organs, especially the tubes and ovaries. In many cases it is impossible to have all the conditions necessary for certain diagnosis. He gives a critical

analysis of reports of cases to which he adds some personal observations. He concludes that the primary peritoneal implantation of the ovum actually occurs. Implantation in the region of the cul-de-sac is frequent and easy to understand. The necessary etiologic factors are (1) the ovum should be fertilized within the peritoneal cavity; (2) that it does not migrate into the tube; (3) that it has an opportunity to become implanted on the peritoneal surface. The treatment is complicated by hemorrhage which results from operative procedures. It has not been proved that the peritoneal implantation can continue until term. Theoretically, in operative procedures on advanced peritoneal pregnancy, marsupialization of the placenta is preferable to its removal. F. L. ADAIR.

des Lignaris: A Case of Schistosomiasis of the Female Pelvic Genitalia with Subsequent Tubal Pregnancy and Abortion. The Medical Journal of South Africa, 1921, xvii, 46.

The writer reports the case of an Indian woman who presented the rare condition of ovarian bilharziasis. The case is discussed fully and is interesting both because of its rarity and in that it shows the reaction of ovarian tissue towards Schistosomiasis. NORMAN F. MILLER.

Streeter, G. L.: Subcutaneous Implantation of the Human Ovum. Journal of the American Medical Association, 1923, lxxx, 989.

Streeter reports a case of implantation of the ovum in the superficial fascia of the abdomen. The ovum had attained the size of a hen's egg. A well formed embryo with the sac intact was found. Blood vessels leading to the area of implantation were enlarged. Patient had been operated on two years previously, and a round ligament shortening done. The fallopian tube was mistaken for the round ligament on the one side and was drawn up and sutured to the fascia. The fertilized ovum, delayed at the point of kinking, eroded its way through the tube and continued its development in the fascia. The case is probably unique so far as the site of implantation is concerned. W. KERWIN.

Forsyth: Erosion of the Rectum by an Ectopic Placenta. The Lancet, 1923, cciv, 795.

The patient, a married woman aged 34, had an ectopic gestation which evidently occurred in the ampullary end of the tube, and the gestation sac had been extruded by a tubal abortion rather than by tubal rupture. The ectopic placenta had eroded through into the rectum, with the result that there was a clean-cut lesion extending entirely through the rectal wall.

The patient was operated and left the hospital in excellent health.

NORMAN F. MILLER.

Kahn: Infected Extrauterine Pregnancy Rupturing into Bladder after Thirteen Years. Journal American Medical Association, 1922, lxxviii, 889.

The case here reported is that of a woman aged 57, who had been widowed 14 years. Three years prior to her husband's death, she was curetted for irregular bleeding. After her curettage she suffered with severe right sided pain which did not subside with the menopause, but became steadily worse. During the last year and a half of her life she had dysuria, with occasional attacks of severe purulent cystitis. During this time she occasionally passed fetal bones through the urethra, and finally died from sepsis. R. E. WOBUS.

Novak: Bluish Discoloration of the Umbilicus in the Diagnosis of Ruptured Extrauterine Pregnancy. Journal American Medical Association, 1922, lxxviii, 643.

Novak calls attention to the discoloration of the umbilicus in cases of ruptured ectopic pregnancy which was first described by Cullen in 1919. He thinks it is due to the absorption of free blood by the lymphatics of the umbilicus. It varies from bluish--black in recent cases to greenish-yellow in later stages.

R. E. WOBUS.

Chifoliau: Discoloration of the Umbilicus in Intraperitoneal Hemorrhage of Pelvic Origin. Le Progrès Médical, 1921, xxxvi, 534.

Chifoliau reports two cases where the skin in the region of the umbilicus was discolored by an infiltration of blood pigment. One was a case of ruptured ectopic pregnancy with hematocele formation in the posterior culdesac, and the second a case of right ovarian cyst with twisted pedicle. In both of these cases free blood was found in the peritoneal cavity upon opening the abdomen. The author therefore feels justified in pointing out that where umbilical ecchymosis is associated with some pelvic pathology a diagnosis of free blood in the peritoneal cavity may be made.

THEODORE W. ADAMS.

Moore: Intraabdominal Hemorrhage from Ruptured Corpus Luteum. Annals of Surgery, 1922, lxxv, 492.

Moore reports two cases of intraabdominal hemorrhage from ruptured corpus luteum upon which he operated. In addition he reviews those cases which he could find in the literature at his disposal, 14 cases in all. The claim that these ruptures occur at any particular time of the menstrual cycle is not borne out by this series as they occurred at various periods. Rupture was usually preceded by some form of violence such as vomiting, coughing, sneezing, straining at stool or a minor injury. One case ended fatally and the diagnosis was made only postmortem. In none of the cases cited was the diagnosis made before operation.

R. E. WOBUS.

Schumann: Observations on Hemorrhage of Ovarian and Tubal Origin. Journal American Medical Association, 1921, lxxvii, 692.

Schumann calls attention to the fact that hemorrhage into the abdominal cavity from the female genitalia need not necessarily be from an ectopic pregnancy. This is of importance especially in cases of unmarried women who might be wrongfully accused of being pregnant if this fact be not borne in mind.

These hemorrhages are usually from a ruptured ovarian follicle or cyst but may occur from the rupture of the ovary itself. Rupture of a tube has been reported due to violent exercise. The lack of preceding uterine bleeding is a factor in differential diagnosis.

Three case reports are included. A young girl who had symptoms of pelvic hemorrhage recovered without operation. In a woman of 37 years, the hemorrhage was from an ovary showing degeneration of the vessel walls. The third case was that of a simple hematosalpinx in an unmarried woman of 30 with otherwise normal genitalia.

R. E. WOBUS.

Hornung, R.: The Ovary as a Source of Intraperitoneal Hemorrhage. Münchener medizinische Wochenschrift, 1923, lxx, 592.

Like all extremely vascular organs the ovaries are predisposed to hemorrhage, the types being three: follicular, corpus luteum and interstitial. The ovarian

hemorrhage usually comes at the next menstrual period after the rupture of the corpus luteum. Some ovaries may have an idiopathic tendency to bleed but besides such a tendency there are other concomitant conditions such as: any local or general cause leading to active or passive congestion; delay in the menstrual period; any sudden interference with circulation such as twisting of a pedicle; excessive sexual stimulation; possibly trauma and operations on the internal genital organs. Abnormal circulatory conditions with a definite disturbance in the blood forming organs, such as a leukemic condition, certainly plays a part. In acute or chronic abdominal conditions the differential diagnosis is always difficult but whenever there is a question of bleeding the safe procedure is to operate. A. C. WILLIAMSON.

Melchior: Abdominal Hemorrhage Following Rupture of a Small Ovarian Cyst. Paris Médical, 1924, xiv, 39.

Calling attention to the necessity of bearing in mind the possibility of hemorrhage in any acute abdominal condition, Melchior cites a case of hemoperitoneum which was diagnosed as peritonitis due to rupture of the appendix. The right ovary was found enlarged to the size of a mandarine, it was very hard and contained numerous cysts the size of walnuts. One of these cysts had ruptured when the patient alighted from a railroad car. On section the tumor was found to be a fibrocystoma. The appendix was normal. R. E. WOBUS.

Weber, Eric: The Peritoneal Inundation by Rupture of Perifibromatous Varices. Gynécologie et Obstétrique, 1921, iv, 560.

The author gives a short résumé of the literature on this question.

F. L. ADAIR.

Ransahoff and Dreyfoos: Dangerous Intraperitoneal Hemorrhage from Uterine Fibroid. Surgery, Gynecology and Obstetrics, 1921, xxxiii, 296.

Attention is called by these authors to the rare condition where dangerous or even fatal hemorrhage results from rupture of varicose veins situated beneath the peritoneum of subserous fibroids. They report a case occurring in an unmarried woman of 35, whose life was saved by prompt hysterectomy.

R. E. WOBUS.

Töpler: Re-Infusion of Blood in Ruptured Ectopic Pregnancy. Deutsche Medizinische Wochenschrift, 1922, xlviii, 92.

In 1914, Thies first advocated the re-infusion of the blood found in the abdominal cavity at operation for ruptured extrauterine pregnancy. After the tube is clamped, the free blood is dipped out of the peritoneal cavity and strained through 8 layers of gauze to remove clots, etc. It is then diluted with an equal amount of normal salt solution and introduced through a cannula which has meanwhile been inserted into the median basilic vein. The blood is not defibrinated nor is citrate added.

Töpler has used this procedure in 24 cases which were in a serious condition from acute anemia, without a single death. In none of the cases did he experience any difficulty or untoward symptoms. The amount infused varied between 150 c.c. and 900 c.c. The beneficial results were usually immediately apparent.

While Töpler still uses salt solution in the milder cases, he feels that this method will save the life of many a patient who would otherwise die from shock. R. E. WOBUS.

Runge: An Aid in the Treatment of Acute Anemia in Labor. Deutsche Medizinische Wochenschrift, 1922, xlviii, 1924, 156.

In view of the technical difficulty of blood transfusion as well as the delay incident to procuring a proper donor in emergency, Runge has for some time administered the blood lost by the patient in the form of an enema. He was surprised to note the prompt action of this procedure upon the patient's condition. To ascertain the relative amount of blood actually absorbed in this way, he examined the subsequent stools of these patients and in most cases was unable to demonstrate blood either macroscopically, microscopically or by chemical tests. He now saves the blood lost during labor as a matter of routine, and in case of excessive blood loss, mixes 600 c.c. of the blood with 400 c.c. of a 0.9 per cent solution of sodium chloride. To this mixture he adds a solution containing from 1 to 4 per cent of sodium citrate. The mixture is then introduced as an enema. Patients usually retain at least from 600 to 700 c.c. In severe cases he administers from 600 to 1,000 c.c. in addition by the drop method.

R. E. WOBUS.

Zimmermann: Indications for Retransfusion of Blood Poured into the Abdominal Cavity. Zeitschrift für Geburtshülfe und Gynäkologie, 1921, lxxxiv, 335.

Clinical experience and also a considerable number of animal experiments made by the author indicate that the peritoneal cavity may under normal circumstances absorb even large quantities of blood poured out into it. The large proportion of erythrocytes which thus arrive in the peritoneal cavity are returned to the blood stream so quickly that their functional capacity is unimpaired. So rapid is this absorption by the uninjured peritoneum that it is impossible to produce hematocele experimentally by the single injection of a large amount of blood. When an extrauterine pregnancy ruptures the blood flows comparatively slowly and often in several stages into the peritoneal cavity and there is thus given opportunity for clotting and for defibrination. Since none of the experimental animals showed peritoneal irritation, the author believes the clots must be the cause of the fibrinous exudates and the adhesions seen clinically. These adhesions interrupt the capillary stream normally directed toward the diaphragm, and render impossible an effective resorption. When the case comes to operation and these adhesions are separated and the clots removed, conditions favorable to absorption are restored, and the remaining fluid blood is rapidly returned to function in the patient's blood-stream. The author's practice, therefore, in cases of non-infected accumulations of blood in the peritoneal cavity in cases of ectopic pregnancy, is as follows: The hemorrhage is definitely controlled; easily accessible coagula are rapidly removed and the fluid blood is allowed to remain. This is defibrinated and therefore is no longer coagulable. A rapid resorption of the fluid blood takes place. This is evidenced clinically by the very rapid recovery of these patients.

Since the results of peritoneal absorption are so brilliant, and intravenous reinfusion is not without considerable danger, the author believes the indications for the latter should be very distinctly limited. When during the operation the patient's condition becomes worse instead of improving, when her pulse does not return, and a lethal outcome seems imminent, then reinfusion should be tried as a life saving measure. Even in these cases certain conditions must be fulfilled: The blood must be fresh, not toxic and not infected. Absence of infection may be demonstrated by examination of a smear stained for bacteria. That it must be fresh means that the red blood cells must still be func-

tionally capable. This may be demonstrated by absence of signs of degeneration of the red cells in a fresh unstained smear. The blood should, however, have been poured out sufficiently long to have become defibrinated, since absolutely fresh blood entails the danger of clotting and embolism. Toxicity may be due to degeneration of the erythrocytes or to an increase in the ferment content of the blood. The latter cannot be determined by any easily performed clinical test, yet if we limit reinfusion to the cases which would surely die without it, we may ignore the risk from this factor. MARGARET SCHULZE.

Eick: Bleeding from Corpus Luteum Simulating an Attack of Appendicitis. Zentralblatt für Chirurgie, 1924, li, 374.

A delicate young lady, fairly well nourished, is suddenly seized with acute pain in the right lower quadrant a few days previous to an expected menstrual period. The pain persisted to the following day and there was some nausea. Temperature slightly above normal; bowel movement normal; no urinary disturbance. The pulse was 96 and regular, the abdomen soft and not distended. In the right lower quadrant, however, there was a tendency to rigidity and there was distinct tenderness at McBurney's point.

Under the diagnosis of appendicitis, the abdomen was opened. The appendix was found to be normal. After the appendix was removed, fresh blood was seen to well up from the pelvis. The uterus and adnexa were found to be normal, except for a bleeding point from a corpus luteum in the right ovary. The ovary was removed and showed a corpus luteum of 10 or 12 days' duration with a rupture on its surface. The ovarian vessels were engorged and a ruptured vessel was found at the point of rupture which, however, was filled by a thrombus, indicating that the bleeding probably originated in the depths of the corpus luteum which was partly filled with blood clots. Menstruation appeared two days after operation.

R. E. WOBUS.

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